JUNE 1958

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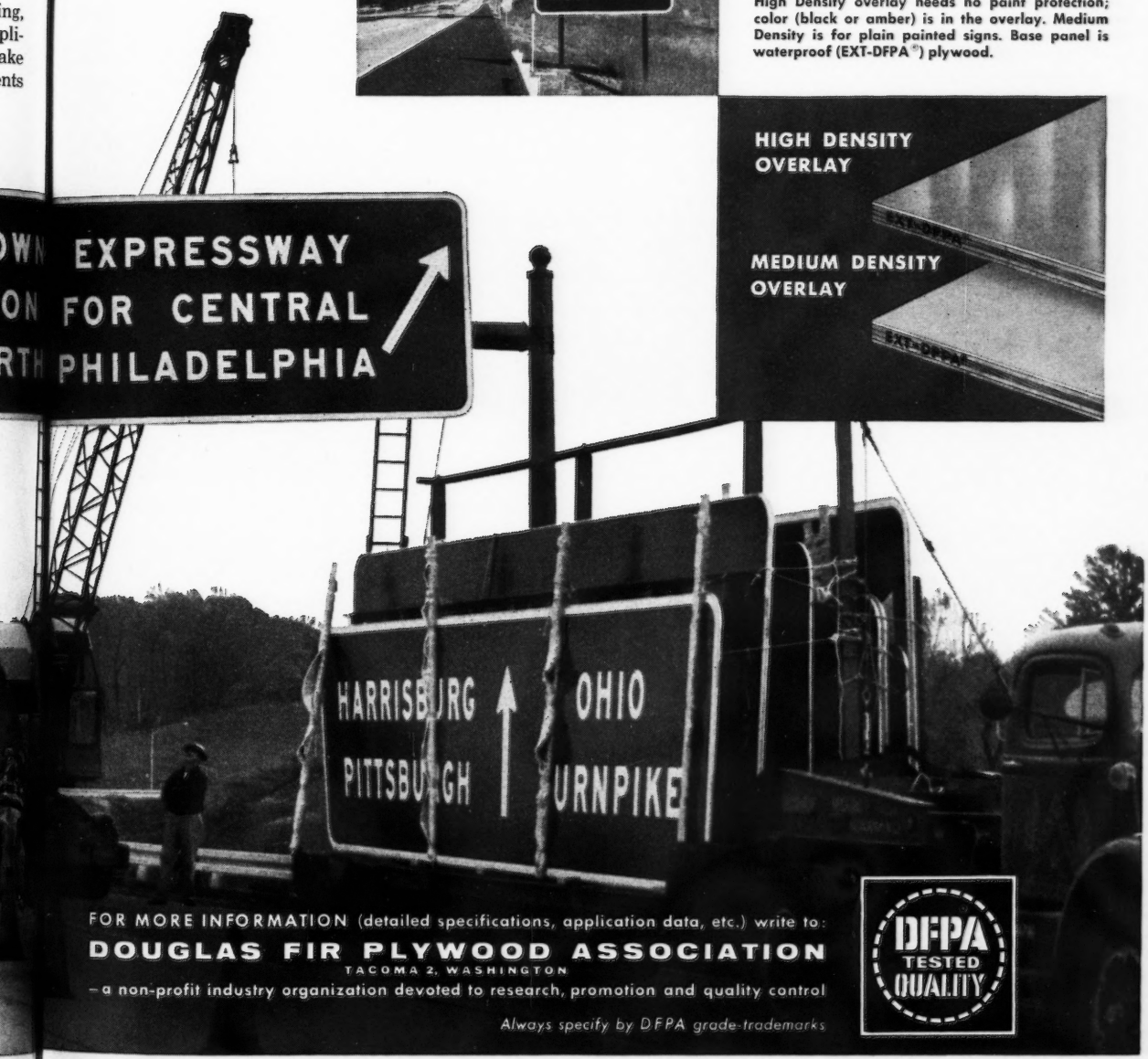

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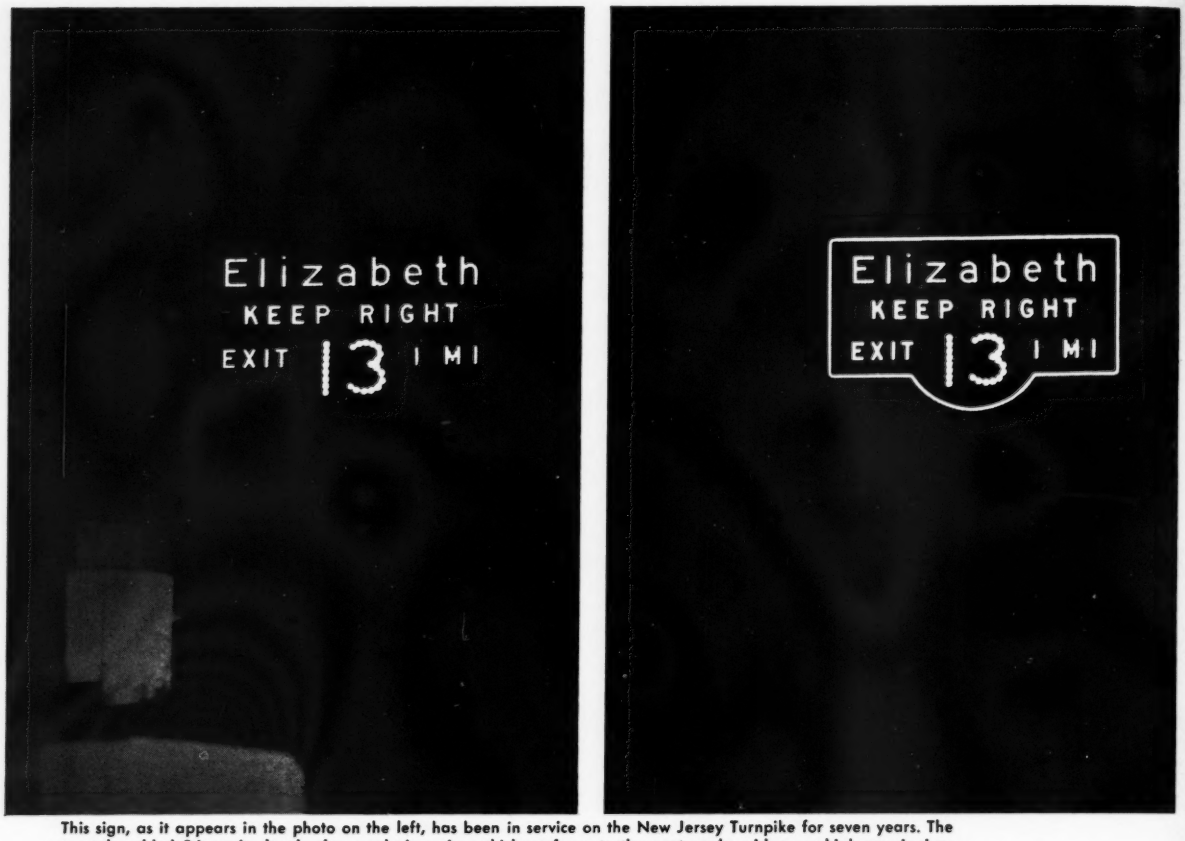

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TRAFFIC ENGINEERING

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

Vol. 28 JUNE, 1958 Number 9

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Cover: Gulfgate shopping center, near Houston, Texas, with near capacity use of the parking facilities.

—Photo courtesy John Graham & Co., Architects and Engineers.

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Frankly Speaking . . .

DURING THE PAST FEW MONTHS public interest has been aroused to the need for applying scientific research to unlock the secrets of nature. Educators and laymen alike have been spurred to seek ways of attracting men and women to these fields.

Certainly traffic engineers should join this movement. This organization and its members should do everything possible to make such a career a rewarding one.

We are faced with a future which is going to bring about revolutionary changes in highway transportation. Our nation is growing. The number of drivers is expected to increase 25 per cent by 1966, vehicle registrations are expected to increase 34 per cent and travel by 47 per cent.

But greater use isn't the only change we can expect. Changes are going to be made in the vehicles we ride in and the highway we travel on. New vehicles using a new and completely different form of propulsion are in the planning stage. And new electronic controls for our highways are being tested. Thus the need for real research into the fundamentals of traffic engineering is apparent.

Research does not consist of gathering statistics. It involves a study and analysis of those statistics to see just what they mean. It involves discovering new facts which are now unknown.

We don't know enough about the relationship of the vehicle to the highway. And we won't know until each of us becomes research-minded. We have to convince ourselves that to discover hitherto unknowns is the important job ahead of us.

When each of us becomes research-minded, we will be able to make our proper contribution to a future which promises radical change in highway and vehicle design. Only then will we be able to plan intelligently for the future. Only then will we have the knowledge so necessary to make highway transportation contribute its full share to the welfare of our nation.

HERBERT C. HIGGINS
Director, District 6

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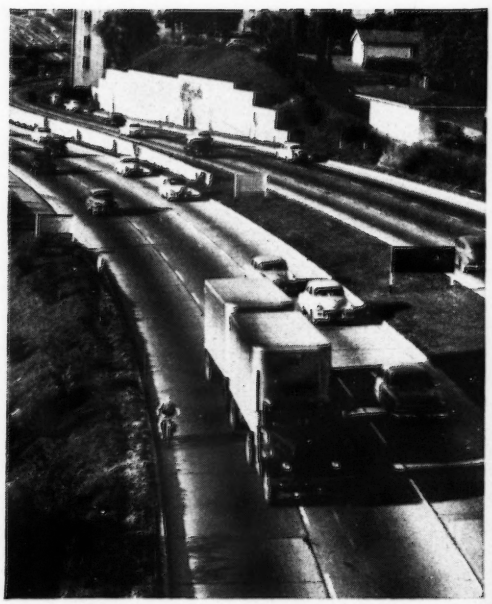

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The Relationship Of Engineering Science To Highway Safety

By Charles W. Prisk
(Mem., ITE)
Director, Highway Safety Study
U. S. Bureau of Public Roads

SCIENCE AND ENGINEERING are familiar headline topics these days. Much of what we read deals with satellite launchings, simulated trips to the moon and other spectaculars. Space travel, we call it, and many of the best scientific brains of private industry and government are grinding away on the problem it presents. I would remind you that highway travel on the face of this planet we call earth is also space travel. In the main, it has essentially two dimensions rather than three, but give a moment's thought to the complications of our 2-D highway space travel. I think of several that have special significance as we turn attention to the engineering aspects of highway safety.

Of longest standing, of course, are the obstacles of topography—mountains, rivers, deserts, lakes, and swamps. These have had their effect on the engineering and development of both the highway and the motor vehicle. Highway design, for example, has increasingly moved in the direction of flatter grades to improve hill-climbing performance. More engine power has been built into all motor vehicles, at least in part for the same purpose.

A second complicating factor of highway space travel is the tendency of people to bunch together in urban communities. More than 63 per cent of our present population resides in urban places. This closeness feature has economic and social advantages but the skyscrapers, high real estate values, industrial investments in plants, and other man-made features of the typical city are as effective and formidable a barrier to highway transportation as Nature's Rocky Mountains. Through better planning and understanding of urban transportation requirements as a segment of the total needs for modern urban living, some progress against the barriers of the city is also being realized.

But foremost, I would say, among the complexities of highway space travel, is the matter of its safety. The United States, occupying only 5 per cent of the earth's land area, drives 66 per cent of the world's motor vehicles. Of all forms of passenger transportation, the private automobile chalked up the greatest pasesnger-mile gain in 1957. The preliminary estimate shows a total of 639 billion passenger-miles last year by automobiles. The passenger-miles of travel handled by our fast-growing domestic airlines business were only 4 per cent of the automobile total.

Those figures alone suggest that we are well ahead in the highway space travel race, as surely we are. This is chiefly because the motor vehicle is so integral with the way we live. Behind the iron curtain the situation is quite different. For every 1,000 persons in Russia there is an average of less than 2 pasenger cars; in the United States, the corresponding figure is 318 passenger cars. This striking difference emphasizes the fact that any threat to safe use of automobiles in the United States is at the same time a threat not just to lives and property as such, but more deeply speaking, to our collective survival, both domestic and international. This sobering fact is probably the greatest justification for the scientific approach to the highway safety problem.

The scientific approach, incidentally, has been resisted a long while by some who regard highway safety a byproduct of adequate action in various other areas rather than an objective in itself. Other resistance stems from those who, with too much emotion, wring their hands under the delusion that a single cause, high-powered automobiles, defective vision, or crooked highways, is chiefly accountable. Others mistakenly believe that accidents originate largely with a small and defective portion of our population which, if kept off the highway, would largely solve the problem. Still others fight the method because it appears too complex and expensive, or because it seems unlikely to serve their particular self-interest. These and other resistances to the scientific approach to highway safety are definitely with us. Many of them are exerted from high level positions, some from low, and some from the side. A letter I received a few weeks ago has this to say about the scientific approach:

"Dear Sir:

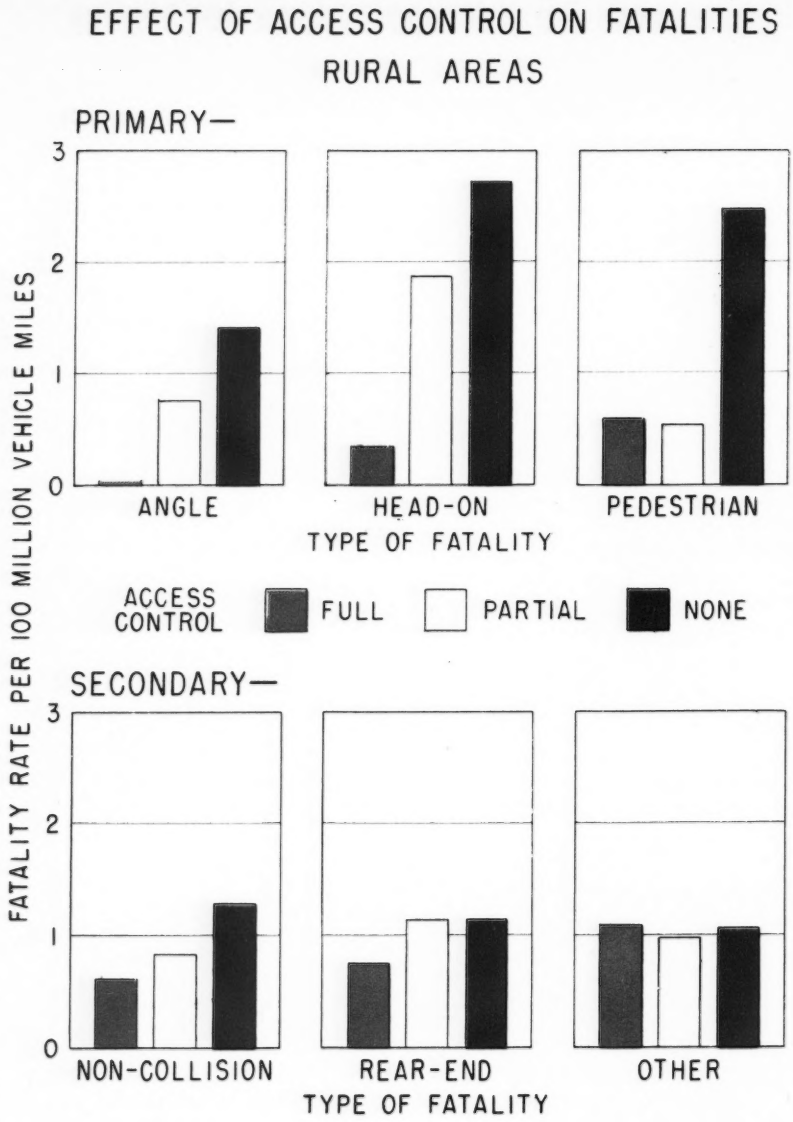
"On your staff of experts you have need of a good wormologist. Everybody has pinworms. I firmly believe this trouble is the major cause of accidents. (It affects the mind in an incredulous way.)

"I belive it is Faust who says pinworms is the great American disease. Even he would not go so far as to say everybody has pinworms, but then, neither has he studied the disease forty long years as I have.

"If you would like to make use of my priceless knowledge (which no one will believe) I will be available May 16th at 3:45."

In our free-wheeling democracy, with 67 million vehicles amongst the United States population of 170 million, it is not surprising that widely differing ideas are heard. The pursuit of these is far from the scientific approach which the engineer, by training and experience, has been so accustomed to follow.

Prepared for delivery at Human Behavior Research Conference of President's Committee for Traffic Safety, at Williamsburg, Va., February 23, 1958.



As most of you know, the scientific approach is a very simple thing to explain, though not so easy to execute. It has only four steps. First, the problem is defined, and second, the facts are collected. Next, the facts are classified and analyzed, and finally, a solution is chosen and tested. This approach is as essential for orderly progress toward improvement of today's highway safety situation as it is for rational development of the vehicles and highways themselves. I sincerely hope that the best of our thinking will follow the scientific approach and that we shall quickly identify and exterminate any assaults from the pinworms.

Now let us examine more precisely the nature of the relationship between the engineering science and safety. It has two major facets. One is concerned with functional design and building of our rapidly expanding motor vehicle fleet and the highways on which that fleet moves. The second is the newer scientific endeavor directed toward efficient and safe operation of vehicles and of the vast highway plant which is so essential to our daily needs.

Any of you who have had the opportunity to visit the impressive GM Technical Center in Detroit would hardly disagree that you sense there a tremendous effort dedicated to functional design and construction of the new automobile. Research and engineering personnel are hard at it. Of that there is no doubt. The same is true at Ford, Chrysler, and with the independent companies. Now what have they done for safety? Actually, the list of safety advancements is long and reasonably impressive, even if you start with the introduction of 4-wheel brakes and come up to date with the 4 headlamps and wrap-around glass on the shiny 1958 models. We might also ask, "How much are these features worth in terms of safety?" Very little evaluation is available, unfortunately.

The vehicle is condemned in many public places for its top speed but this is not a very well understood charge against the vehicle. Here are some of the facts: In 1941 the average top speed capability of passenger cars was 86 miles per hour. In 1955, it was 97 miles per hour. Studies conducted by the Bureau of Public Roads in cooperation with more than half the State highway departments indicate that from 1941 to 1957 the average driving speeds increased from 48 miles per hour to 52 miles per hour on main rural highways. This is not the sort of evidence that confirms any reliable association of horsepower, speed, and accidents.

This is not to say that accidents are not often preceded by speeds too fast for the conditions. This is almost always true. Better steps need to be taken by the manufacturers and by public officials alike to control speeds. Effective road speed governors have only recently been introduced as an aid to the driver in maintaining a chosen travel speed. One of my favorite ideas envisions an external speedometer that is there for all other drivers to see. This is simply "belling the cat," but it would serve as one means to improve the communications among all drivers, not to mention police patrols, within view. As things now stand, the inter-driver communications is largely confined to directional signals and brake lights.

A similar vehicle engineering improvement would see the use of amber taillights, reserving the red for the brakelight indication, which always signifies an intention to slow or stop. Now, these would seem to be reasonable ideas but their impact on the basic safety built in to the vehicle cannot readily be determined. Consequently, in the highly competitive automotive industry, it is the change that produces a substantial sales appeal that has the best chance for incorporation.

One encouraging development is the research being carried forward by

Cornell University in the field of crash injury research and safe vehicle design. Largely from the results of special analyses of vehicle design in relation to injuries received in accidents, this work has proved the worth of recessed hubs on steering columns, door locks that keep occupants within the vehicle, lap safety belts, and padding of the instrument panel. These findings have been sufficiently conclusive and consistent with industry research as to have been rather generally adopted.

Other work, looking beyond the mere packaging of passengers to the larger and more basic challenge of avoiding the accident itself is being initiated. The Cornell Liberty Safety Car on display this year incorporates many of the crash research findings and other independent work. The Safety Car has 87 special safety features, about half of which are designed to prevent accidents. It has interested a large segment of the American public and the industry at auto shows this winter and may have some favorable effect on future car design.

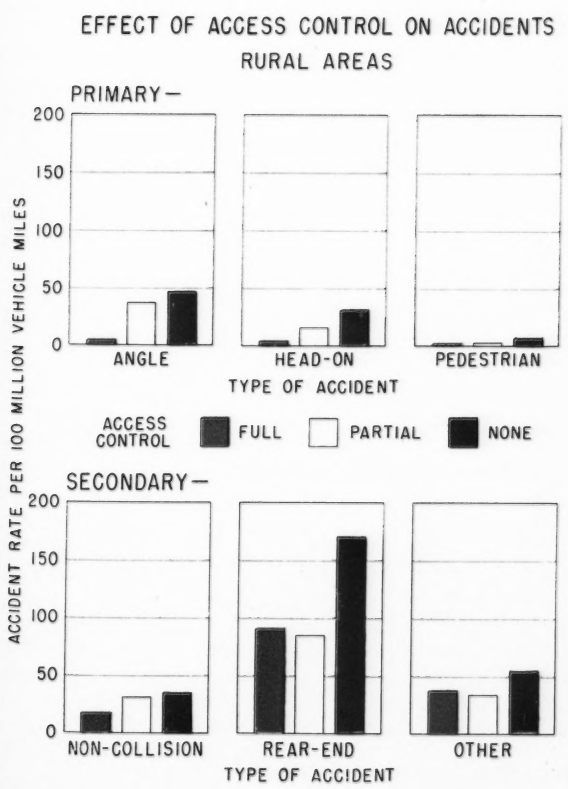
The contribution of engineering to safe vehicle design has some admitted conflicts with the sales-conscious influences in the automotive industry. The eventual product is determined in part by the scientific approach but will probably always remain a compromise of many interests — utility, economy, safety, prestige, and sales acceptance. What the automotive engineer can do is basically circumscribed by the last factor.

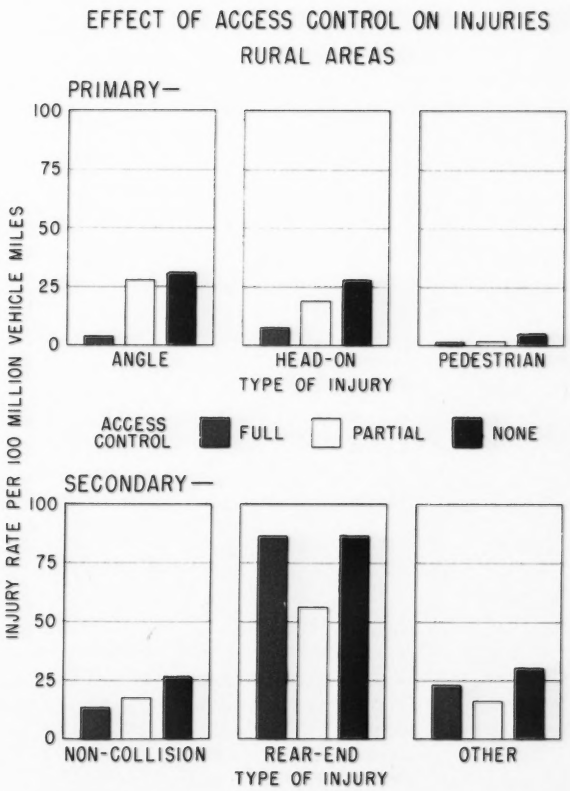
The automotive engineer's position was lampooned in a bit of imaginative writing in a recent issue of Automotive News. It tells the story of a major crisis that hit one of the big three manufacturers. The top engineer-designer was called in and faced the Chairman of the Board. In response to a question of whether he and his staff had a new design that would recapture lost ground in the automotive market, he nodded happily, and began his description. The new design, he said, would be called CALVIN, after the late President of the United States. It would be a quiet, plain, substantial vehicle and always able to perform at modest cost. CALVIN would be six inches shorter in wheelbase, one foot less in over-all length, three inches higher, four inches narrower, and have two inches more road clearance. The Chairman scowled, but the designer went on, saying that chrome and grillwork had been removed, power features had been dropped, horsepower was reduced to a more economical level, few body styles were planned and models were to be changed only once in 5 years in the interest of lowering the first cost and operating expense for the customer. In this satire, the designer continued with similar proposals until the Chairman and the Directors could stand it no more, and the men in white coats were ordered to carry the designer away.

This is pure fiction, of course, but it emphasizes the intricate relation of industrial policy, economics of production and of vehicle operation, advertising and sales, and those efforts made in behalf of a fundamentally safe vehicle.

We might think a moment about the definition of a safe vehicle. Would it not be a vehicle that can be operated without accident by drivers who exercise reasonable care?

I should like to repeat that one of the major handicaps to engineering the vehicle for safety is the inability, incapacity, or unwillingness to evaluate adequately those features of vehicle design that bear most directly





on accident creation, and secondarily, on injury creation subsequent to the accident.

Highway engineering contributions to traffic safety have evolved slowly but through a reasonably systematic though perhaps too limited application of the scientific approach. Over the past 20 years, the Bureau of Public Roads has been engaged in many traffic researches whose findings have been used directly in the refinement of standards for safe highway design. We have normally had the cooperation of our legal partner, the State highway departments, but occasionally other State agencies, motor vehicle, police, or health, have participated. Still other projects are advanced with the cooperation of universities, private research firms, and various national organizations.

In thinking about my role in this meeting, I decided that it might be helpful for you to have the benefit of some of the more pertinent elements of the Bureau's research as it relates to safety and the behavior of drivers. We have therefore prepared a digest of researches selected from our program of the past two decades. These are for your examination and reference during the conference, and, I hope, in future days as well.*

Modern highway design is safe to the extent that it is estimated that 3,500 to 4,000 lives will be saved annually by reason of construction of the 41,000-mile interstate system. Its chief safety feature is planned access, a subject that has been examined in our safety research.

Highways with fully planned access are distinguished by the provision of separate roadways for opposing traffic streams, which eliminates or drastically reduces head-on collisions, the most severe type of accident. The planned access highway, or freeway, has another important safety feature. It has no intersections at grade. Thus one of the more prevalent types of traffic conflict is neutralized. The freeway, by definition and legal concept, permits of no access from abutting property, except as designed connections are made with intersected routes at selected spots. This eliminates the unexpected marginal entrance and exit movements, which are real bugbears for most drivers.

Freeways have easy grades so that even heavy commercial vehicles are able to maintain speeds reasonably consistent with passenger-car traffic, thus mitigating against rear-end collisions. In this category, freeway design appears to have been less effective than in most other types of collisions. As the charts indicate, the rear-end collision along with noncollision accidents and certain miscellaneous types remain as the principal challenge to safe operation on modern highway design. In certain other types of accidents, access control appears not to be of primary importance.

Factual summaries compiled by the Bureau from special reports of 27 States include 47,000 accidents, 30,000 injuries, and 900 deaths occurring on 2,100 miles of highway. Comparative sections with and without access control in rural areas show that freeways have only one third the fatality rate of conventional highways. In urban areas, the benefits are smaller, but still favor the controlled access type of design by a substantial margin. Similar savings are found as rates for accidents and injuries are studied.

Despite the rather substantial work done thus far, much information on the relationship of highway design and operation to safety is still undetermined. However, beyond the need for an improved research attack on the relation of road design and safety lies the deeper need for integrated consideration of the complete operational system. This means not only that there is a demand for accelerating the type of research where the motivations, attitudes, and idiosyncracies of the human element are paramount, but that, somehow, the responsible representatives of the entire range of disciplines concerned with highway safety need to be marshalled into a coordinated research action program.

During the course of the Highway Safety Study now being conducted in the Bureau of Public Roads at the direction of Congress, we have an obligation to assemble broad facts and recommendations regarding the practical future role for the Federal Government in the realm of highway safety. As a member of the Bureau's staff, and as Director of the current Highway Safety Study, I can assure you of the Bureau's intense interest in this type of research.

In closing, I would cite the statement made a few years ago by men much wiser than I, but with whom I am still in enthusiastic agreement: "Only research can enable us to make further progress in traffic safety at minimum cost, and with minimum interference with individual freedom of action, minimum official and public resistance, and maximum public support."

*Note: Copies are available upon request.

MOTOR VEHICLE DEATHS AND DEATH RATES

1956, 1957 and 1958

Month	1956	1957	1958	1956-58 Change	1957-58 Change
January	2,954	2,870	2,740	— 8%	— 5%
February	2,652	2,480	2,360	—11%	— 5%
March	2,940	2,890	2,630	—11%	— 5%
Three months	8,546	8,250	7,730	—10%	— 6%
April	2,970	2,950			
May	3,094	3,000			
June	3,338	3,310			
July	3,555	3,240			
August	3,535	3,690			
September	3,653	3,330			
October	3,476	3,450			
November	3,603	3,570			
December	3,858	3,710			
Total	39,628	38,500			

All 1956 figures are from the National Office of Vital Statistics.
All others are National Safety Council estimates.

Transit-
The Traffic Engineer's Opportunity

By W. S. Rainville, Jr.
Director of Research
American Transit Association
New York City

THE TRANSIT INDUSTRY has, for over a century, been a vital factor in urban growth and development. It continues to make a substantial contribution to the fluidity of passenger movement in our communities today.

In 1956, the last year for which complete statistics are available, the urban transit industry in the United States carried nearly nine billion revenue passengers. This service was performed by some 1,300 companies, operating 70,000 vehicles 2.4 billion miles over 50,000 miles of line.

These operations represent an investment of nearly $4 billion. They produced in 1956 almost $1.5 billion in revenues. Over 60 per cent of those revenues were paid out as compensation to approximately 200,000 employees.

The contribution of transit to the business of urban living may also be measured by its importance as a mode of travel in individual cities. Typical weekday cordon counts indicate that in many cities 50 to 75 per cent of shoppers, retail workers and office employees use transit to reach the central business districts.

Trends of Urban Travel

It may be argued that transit does not occupy the relative position of importance, from the standpoint of the average urban dweller, which it once did. No one from the transit industry would argue to the contrary in the light of the facts shown in Table 1.

The *average* urban dweller takes 57% fewer transit rides each year than he did 30 years ago. Individual citizens, however, are as dependent upon transit for their movement now as they ever were—a fact which tends to become obscured in a consideration of "averages."

TABLE 1

COMPARISON OF 1926 AND 1956

	1926	1956	% Change
Urban population of the U.S.	63,000,000	93,300,000	+ 48%
Urban transit revenue passengers	14 billion	8.8 billion	— 37%
Riding Habit (i.e.—"revenue rides per capita")	220	94	— 57%
Ratio Operating Income* to Operating Revenue.....	14.5%	3.9%	

*Income from the operation of transit properties **before** income deductions (interest on bonds and other capital debts), Federal income taxes, and dividends.

The dominant factor in the decline of the urban transit riding habit is, of course, the private passenger automobile. We need only to look around us in the public streets, or savor of our own experiences as members of the modern American family, to understand that this is so without recourse to statistics.

The transit industry has waged a rather successful battle against the adversities which have beset it. Caught in a spiral of high material costs and increasing labor charges, the companies have been forced to raise fares several times since V-J Day. This has discouraged riders—but not at rates of passenger loss which have been characteristic of fare rises in less prosperous times. The price of the transit ride has been rising along with the prices of other family necessities. So have the salaries and wages of transit riders.

Every effort has been made to improve operating efficiency and to render as much service as possible per dollar of operating expense.

Despite these measures, the ratio of operating income to operating revenue has dropped to less than 4 per cent as contrasted with nearly 15 per cent 30 years ago. Between 1940 and 1957 operating revenues rose 87 per cent, depreciation increased 108 per cent . . . 1957's industry earnings amounted to roughly but 1.4 per cent on its investment—hardly a showing designed to attract new capital.

Since January 1, 1954, 67 transit companies have completely abandoned service and in 41 cases no successor company has been found.

Transit has been active in seeking relief from burdensome taxes and special imposts, some of which are relics of the day when it was a lucrative business. In the 10½ years to mid-1957, over 200 cases of tax relief have been reported.

In addition, outright subsidies were granted in eight cases, all but one of these being in Canada. The attitude of some private companies in the United States towards subsidies has changed markedly in recent years. There is now an acceptance of the idea in some quarters that subsidies are appropriate where noncompensatory services are insisted upon by the public or by regulatory bodies, provided the basic responsibilities and incentives of private ownership are not removed or diminished. Of course, municipal transit operations in several of our larger cities are subsidized through taxation

Based on a lecture by Mr. Rainville before students at the Bureau of Highway Traffic, Yale University, March 12, 1958.

Before "No Parking" Ban

After "No Parking" Ban

"Before-and-After" photos dramatically show how prohibition of curb parking makes more street space available for movement of all vehicles at Wilkes-Barre, Pa.

to cover such construction and operating costs as cannot be covered by passenger fares.

There are approximately 50 publicly-owned transit operations in the United States, including those serving New York, Chicago, Detroit, Cleveland, Boston, San Francisco and Seattle. The trend towards outright public ownership has been steady, but not accelerating. It has been found that public ownership per se is not the solution to the financial and operating ills which beset the industry. In at least four recent instances the city "take-over" has been under a leasing arrangement, under which the former "private" management continues to operate the system for a fee. Such arrangements result in savings in taxes.

Transit managements have also "accentuated the positive" in many ways with straightforward innovations leading to service improvements. These include:

- Park—Ride Service
- Courtesy Parking Services
- Ride & Shop Service
- Express and Express-Local Services
- Club Bus Services
- Special Shoppers' Services
- Special Events Services
- Direct Routes to Large Plants
- Direct Routes to Shopping Centers
- Charter Bus Services
- Other Promotional Plans

Many transit managements have spent additional dollars on new vehicles to enhance attractiveness and increase social acceptance through use of color, more comfortable seats and seating arrangements, etc. In some instances air conditioning has been added. The American Transit Association has an active committee, one of whose objectives is to stimulate manufacturers into building more "rider appeal" into vehicles.

Additionally, transit companies have endeavored to work with city and traffic officials to improve speed and convenience for the transit rider through various accepted traffic engineering techniques.

For example, better control of curb parking has in recent years been urged in nearly thirty cities, and has been inaugurated in more than fifty per cent of these places. Similarly, use of transit lanes or streets has been recommended in 25 cities, and is actually being tried in 10.

The Community Problem

The increase in numbers and growth in utilization of the automobile have not created a problem for the transit-industry alone. They have created a community problem of far greater significance, characterized by the suburban "spread-out" of metropolitan areas on the one hand, and by the strangling congestion of downtown city streets on the other.

About two-thirds of all automobiles are owned by people in urban areas, yet urban streets comprise only about 8 per cent of our total roads. It has been estimated that the 38,000 miles of urban *arterial* streets — comprising only 1.1 per cent of total rural and urban mileage — carry more than 40 per cent of the total travel mileage! This creates traffic congestion in cities, and the economic waste related thereto. It gives rise to the problem of where to terminate these vehicles — the great demand for on-and-off street parking facilities. It has also given rise to present and proposed expenditures of billions of dollars for street and highway improvements, including expressways, the effect of which has been to attract more traffic and to fill and overrun the new facilities before they have scarcely begun to show tire and grade marks.

The future of the central city is today the concern of city officials, urban planners, traffic engineers, retailers, real estate interests, the tax collector, state and Federal governmental agencies, and many other groups, who are becoming increasingly aware of the dangers of continued downtown

congestion. It is slowly, but surely, becoming apparent that an unfettered expansion of automobile utilization with a "blindly following" program of street and highway improvements is not the answer if the central city is to fulfill its role in urban metropolitan growth and development. A better balance between the use of the automobile and the public vehicle must be restored. In the vital job of MOVING PEOPLE, future plans must include properly balanced programs for street improvements, off-street parking, and improvements in the urban transit system and its facilities.

Transit's Basic Efficiency in the Movement of People

The transit vehicle is the most efficient and effective means available for moving people.

What would traffic engineers do to handle movement of people entirely by automobile if the transit system were permanently removed? How would you meet the problem *physically* within the space limitations of present central business districts? How would you cope with this problem *economically* in terms of the waste involved, and *financially* from the standpoint of the dollars and cents needed to solve it IF it COULD be solved within current physical limitations?

Let us consider, for the moment, Atlanta. In the afternoon peak half-hour, 12,164 transit passengers in a recent cordon count left the CBD in 251 vehicles. It would have taken, on Atlanta averages, an additional 7,360 automobiles to carry these persons—this load to be imposed on the outbound traffic lanes along with the 5,310 automobiles now using them. The stream of outgoing automobiles would have to be more than *doubled*; so would downtown parking space. Where would the space come from? Where would the money come from—to solve this problem through the use of the automobile alone?

Looking at the efficiency of the transit vehicle AFFIRMATIVELY, let us consider it as a tool of the traffic engineering profession for the solution of urban transportation problems; let us consider it on a more-or-less "mathematical" or "scientific" basis. The efficiency of the transit vehicle gives the traffic engineer an opportunity to prescribe solutions for the problem of downtown congestion which are practical and feasible in terms of space and money.

Express bus service on existing streets has proved popular in St. Louis and several other cities. Note well-marked bus stop, with information on time required to ride downtown.

Take the average automobile of today's vintage — some 17 feet long and 6½ feet wide. It requires a space of 110 square feet over which to "exist" at any moment, and seats an average of 1.5 passengers during peak periods. A large transit bus, some 40 feet in length and 8½ feet wide, handles 60 passengers with ease (a few more if necessary), and occupies 340 square feet at any moment.

Thus, the bus described is the equivalent of forty automobiles at average automobile loadings. Its use to move these passengers would relieve the streets of forty automobiles and would constitute an important contribution to the relief of downtown traffic congestion. Remember, the basic problem is one of movement of PEOPLE, not vehicles; for it is PEOPLE, NOT automobiles, who work downtown, shop downtown, etc.

The bus takes up more room in the public streets but requires much less street space per passenger:

Motor bus—340 sq. ft. divided by 60 passengers, or about 6 sq. ft. pass.

Automobile—110 sq. ft. divided by 1.5 pass., or about 75 sq. ft./pass.

Thus, in its "static" use of street space, the transit vehicle is 75 ÷ 6 or 12½ times as efficient as the automobile in carrying passengers.

The transit vehicle for a number of reasons, several beyond its control, is *slower* than the automobile due to its need for passenger interchange, traffic interference, etc., and, thus, should be penalized for occupying its relative number of square feet per passenger *longer*.

Let us assume that the transit vehicle operates only ¾ as fast as the automobile:

12.5 × ¾ equals 9.4; or,

correcting for its longer occupancy of any one square foot of space due to its relatively slower speed: the transit vehicle is STILL 9 times as efficient as the automobile in its use of street space to move persons.

What a tool this is for the traffic engineer to have in his kit! A "nine to one" opportunity to do a better job —and use far less space and far fewer dollars in doing it!

The Terminal Problem

Transit and the automobile differ in one highly significant respect which has no direct relationship to their use of street space for MOVEMENT—but which does directly and definitely affect their relative TOTAL SPACE REQUIREMENTS.

— When the transit rider arrives downtown he alights from the vehicle "ready for business."

—When the motorist arrives he must first find a space in which to LEAVE his car—in an unmetered or metered parking space on-street, or in a lot or a single-or-multi-storied garage off-street. This space comprises the space taken up by his car and a margin for maneuverability—an added 4′ × 6.5′, or 26 square feet. On a "per passenger" basis, this amounts to an additional 26 ÷ 1.5 or 17 sq. ft. per auto passenger; adding the 75 sq. ft. per

passenger for the vehicle itself, we have 92 sq. ft. per automobile passenger for a parked car in the downtown terminal area.

This is a real, definite, and inescapable requirement for the automobile—92 sq. ft. per passenger in which to park; 75 sq. ft. per passenger occupied any moment while in motion. Contrasted with this, the transit rider requires NO PARKING SPACE, and only 6 sq. ft. per passenger while in motion.

An Illustration

Let us devise, for purposes of discussion, a new unit for comparing relative efficiencies of transit and automobile in the use of total space. We will call this the "square foot–hour," meaning a square foot of space occupied for one hour.

Now let us assume a practical problem in the urban movement of persons.

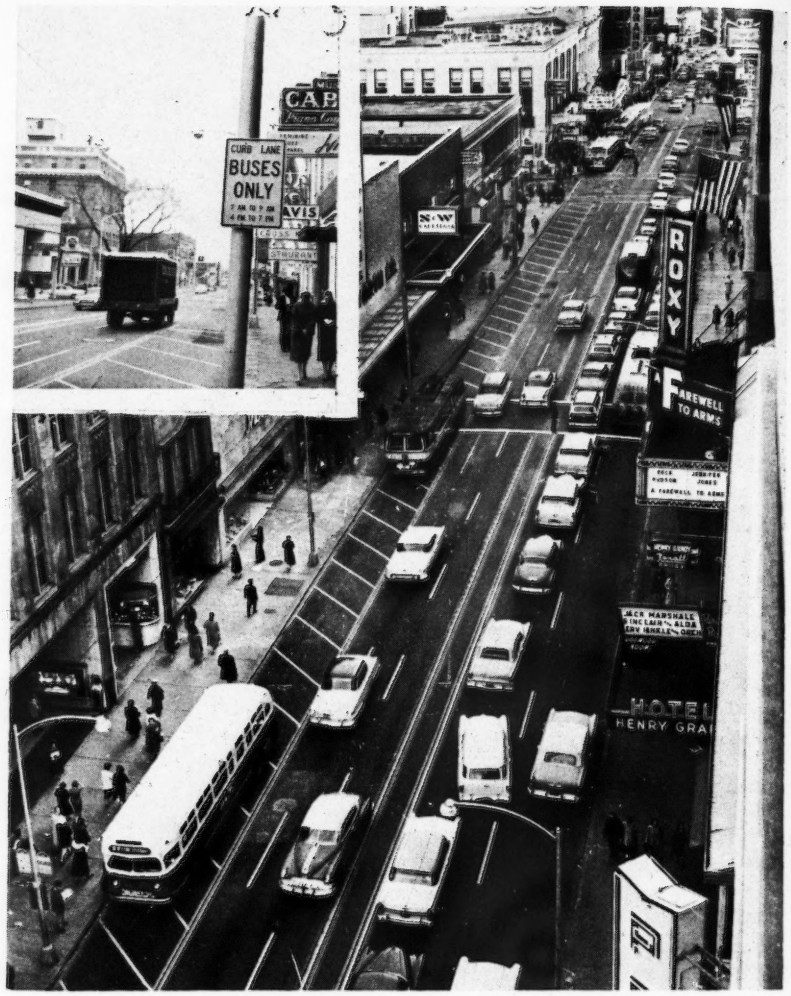
Our O-D survey shows 1,000 persons in a zone three miles from the central city who wish to go there and return each day to and from work. The layout of streets, signal spacing and timing, and densities of traffic permit the automobile to travel at an average of 15 miles per hour (0.20 hr. travel time) over this stretch; the bus can average about 10 M.P.H. (0.30 hr. travel time) under the same conditions.

The comparative imposition made by these 1,000 daily workers upon the downtown area by the two modes of travel is shown on Table 2.

Thus, we see a relative efficiency in handling these 1,000 persons over their three-mile home-to-work movement of the order of

$$\frac{766{,}000}{3{,}600}, \text{ or } 213 \text{ to } 1,$$

in favor of the motor bus! . . . Yes, with the parking requirement considered (and it is inevitably linked with the automobile) transit buses on arterial streets can be as much as *200 TIMES* as efficient as the automobile in meeting the travel requirements of the working population!



Exclusive lane for buses in Atlanta is reported to have speeded up movement of all traffic during peak hours. Automobiles moved 110 per cent faster in the morning rush-hour and 61 per cent faster during the evening rush. Transit vehicles were speeded up 4 per cent and 33 per cent respectively. Atlanta officials were so pleased with initial experiment that further trials were ordered in three additional locations.

Ridiculous? Not at all! This is just a new way of looking at traffic congestion which forces the parking problem into the basic arithmetic of "transit versus auto" in the use of downtown space. It points up more sharply the importance of transit as a tool for the traffic engineer, and as his opportunity for achievement of sound, worth-while results in his local community. The above line of reasoning, for example, suggests the advantages of combining the automobile with transit in large cities for the longer home-to-work ride through the provision of fringe parking lots to keep the terminal (parking) problem away from the crowded downtown section, permitting the motorist to complete his journey in the more efficient transit vehicle.

TABLE 2

SPACE–TIME REQUIREMENTS (sq. ft.-hours)

	In movement, going*	Parked downtown**	In movement returning*	TOTAL DEMAND
By automobile	15,000	736,000	15,000	766,000
By bus	1,800	—	1,800	3,600

NOTES:

*Auto 1,000 × 75 × 0.2 equals 15,000 sq. ft.-hrs. in movement.
**Auto 1,000 × 92 × 8.0 equals 736,000 sq. ft.-hrs. parked 8 hours downtown.
*Bus 1,000 × 6 × 0.3 equals 1,800 sq. ft.-hrs. in movement.
**Bus 1,000 × 0 × equals 0 sq. ft.-hrs. (NO PARKING REQUIRED).

Transit on Expressways

The efficiency of transit should also be considered.

Table 3 gives the equivalent number of automobiles and traffic lanes required to accommodate the transit passengers that could be carried by express transit vehicles operating at practical capacity on an expressway. The following assumptions were made in preparing this table:

TABLE 3

LANE PRACTICAL CAPACITIES FOR TRANSIT VEHICLE TYPES, WITH EQUIVALENT NUMBER OF AUTOMOBILES AND EXPRESSWAY TRAFFIC LANES

Type of Transit Vehicle or Unit	Rush-Hour Period: Carrying Value (CV) per Unit	Rush-Hour Period: Riders per Unit (80% of (CV))	Practical Capacity Express Service: Headway (Sec.)	Practical Capacity Express Service: Units per Hour 1-Way	Practical Capacity Express Service: Riders per Hour 1-Way	Equivalent No. of Autos for Same No. of Transit Riders	Equivalent No. of Traffic Lanes 1-Way
Motor bus–50 seat	70	56	30	120	6,720	4,480	3.0
Trolley coach–50 seat	70	56	30	120	6,720	4,480	3.0
Street car single unit–60 seat	100	80	30	120	9,600	6,400	4.3
2-car unit–120 seat	200	160	45	80	12,800	8,530	5.7
3-car unit–180 seat	300	240	60	60	14,400	9,600	6.4
Rapid transit train	1,500	1,200	90	40	48,000	32,000	21.3

(a) Transit vehicles or units are loaded up to 80% of their combined seated and standee "carrying value" (CV) for the rush-hour period;

(b) Automobiles carry an average of 1.5 persons per vehicle, the current average occupancy for peak-hour travel in some localities;

(c) Number of transit units per hour represents approximate practical capacity for express service;

(d) Lane capacity for automobiles is calculated on the basis of 1,500 vehicles per lane per hour (see footnote).

Thus, the presence of express motor buses on an expressway would provide the same passenger-carrying capacity as 4,480 automobiles, or three one-way automobile traffic lanes.

At the other end of the scale, the presence of a rail rapid transit line in the expressway median would provide the same passenger-carrying capacity as 32,000 automobiles, or 21 one-way automobile traffic lanes.

The placing of public transit on urban expressways is largely premised upon the idea that there is merit in an effective and efficient use of public funds. Economic studies should be made of the investment required with and without the use of transit on urban expressways. Included should be the added cost of access roads to carry a greater number of automobiles if transit is not used. It would seem proper also to include the added cost for parking facilities to accommodate the increased numbers of vehicles to be parked if plans do not contemplate the use of transit on expressways.

NOTE: The lane capacity for automobiles is based on the practical working (or design) capacity as defined by the Committee on Highway Capacity of the Highway Research Board. With 10 per cent commercial vehicles this would be reduced to 1,365 automobiles per lane per hour on level terrain, and 1,155 on rolling terrain with moderate grades. With 20 per cent commercial vehicles, the capacity would be 1,250 on level terrain, and 950 on rolling terrain with moderate grades.

Getting the Job Done

Now, the $64,000 question — "How will we get the public to use transit in preference to automobiles? How, in the face of demonstrated desires and preferences—and the lengths to which they go to use their own cars—will we get people to use the more efficient means of movement?"

The answer is, in essence, three-fold. The result can be accomplishel through:

(1) Conscientious, consistent, and PERSISTENT application of traffic engineering principles and pratices;

(2) Improvement in the speed and convenience of public transit;

(3) Exercise of leadership by elected and appointed officials.

I have been impressed by the oft-stated "three E's" prescribed for the relief of traffic congestion in our cities —ENGINEERING, EDUCATION AND ENFORCEMENT. They hold the clue to a sound approach.

At the outset, the traffic engineer must practice his profession literally —he must "engineer" the most efficient and effective use of street facilities at his command today, and those he may reasonably expect to come into being in the future. Space needed for vehicle movement must not be used for vehicle storage. The traffic engineer must boldly prescribe limitations on parking where movement should be assigned priority. Vehicles to be parked must go elsewhere to do it, or their owners must adopt another mode of travel.

City and police officials must back the traffic engineer's recommendations. They must be made a matter of public ordinance, which requires fearless progression through the local legislative process. Necessary regulations must be given publicity and conspicuously posted in the streets to which they apply. And—the accent must be upon ENFORCEMENT, for all the rest means nothing unless the public is made to conform with practices deemed best in the interest of the entire community.

Most of our cities already have adequate traffic and parking ordinances. The lapse comes when we hit the actual street itself—in the simple process of persistent ENFORCEMENT without fear or favor by police and traffic magistrates. Fines, and jail sentences, if necessary, should be meted out where deserved. Such a program may reduce the numbers of automobiles in the downtown areas and (if you will) "force" some motorists to transit as an alternative simply because there is not room for their cars downtown within convenient walking distance of their destinations—when existing ordinances are strictly enforced. This is a very different approach from attempting to "bar" automobiles from the CBD.

Next in importance is the cooperative effort of transit officials with city, police, and traffic officials in improving the speed and convenience of transit services. A reduction in transit travel time through elimination of delays may well "attract" some automobile users to transit for some of their downtown needs. The improvement in transit speeds cannot be accomplished without attention to the movement of all traffic, and, in turn, cannot result without corresponding improvement for all traffic movement. The procedural manuals soon to be issued by the National Committee on Urban Transportation provide instructions for making simul-

(Continued on page 39)

Maximum Safe Vehicle Speeds At Railroad Grade Crossings

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FOR SEVERAL YEARS the Phoenix Division of Traffic Engineering has been working toward improving the protection at railroad grade crossings in Phoenix. In the fall of 1957, the City of Phoenix requested the Arizona Corporation Commission to enjoin the Southern Pacific Railroad to install flashing light signals at one arterial grade crossing as a test case.

A method was developed by the Division of Traffic Engineering to determine the maximum safe vehicle speed at railroad grade crossings, dependent on the visibility at the crossing and the speed of the train. This method was made a matter of record when the Corporation Commission held a hearing with the Southern Pacific Railroad, and the Commission subsequently ordered the Railroad to install the signal. At the present time this is under consideration in the Courts.

The basic theory involved is in using the physics formulas for speed and distance to compute vehicle speed with respect to train speed so there would not be a collision.

The study was based on a number of assumptions, as follows:

1. The safe speed of a vehicle approaching a railroad grade crossing depends on the visibility and the speed of the train, along with general assumptions for reaction, acceleration and deceleration.

2. When a vehicle is a specified distance from a grade crossing and a train is sighted, there is a speed range that is too fast for a driver to stop and too slow for a driver to beat the train to the crossing.

3. There is a critical speed at which it is safe under all conditions, assuming a perception - reaction time, vehicle deceleration rate and a vehicle acceleration rate.

For the grade crossing of 20th Street and the Southern Pacific Railroad, this critical speed was found to be 12.5 MPH. As this is an arterial street with a speed limit of 35 MPH, flashing light signals are urgently needed; and at the present time an advisory speed sign of 15 MPH is installed.

Procedure

The theory of this analysis revolves around the use of three fundamental physical formulas. These are:

1. $S = Vt$
2. $S = V_0t + \frac{1}{2}\ at^2$
3. $V^2 = V_0^2 + 2as$

Where S = Distance in feet
V = Velocity in feet per second
a = Acceleration in feet per second^2
t = Time in seconds

When a train and a vehicle approach a crossing, there are three possibilities: (1) The vehicle stops for the train; (2) The vehicle accelerates and beats the train; and (3) There is a collision. By using Formulas 1 and 2 above and plotting the initial speed of the vehicle, V_0, versus distance, S, of vehicle and train from crossing, and with t as a parameter, a series of minimum speeds to cross safely are obtained. Formula 3 can be solved to obtain a series of minimum speeds to stop safely for different distances of vehicle and train from crossing.

In using the above formulas, several assumptions are necessary. The maximum vehicle provided for is a single-unit truck of length 30′, and it is assumed that the distance of the driver's eye to the front bumper is 9 feet. In addition to this, other assumptions are:

1. Perception-Reaction time for alert driver, R = 0.75 Sec.
2. Deceleration through braking, d = −15 ft./sec.^{2} (Maximum for truck), and vehicle to clear train by 20 feet.
3. Acceleration to beat train, a = 2.5 ft./sec.^{2}, and vehicle to clear train by 50 feet.
4. Train travels at a constant speed, Vt, which, in the example worked, is 30 MPH.

Reference is made to three methods for computing the critical speeds of vehicles at intersections as developed by the National Safety Council, the American Automobile Association and the American Association of State Highway Officials. These methods are discussed in the *Traffic Engineering Handbook*.[1] The following is a brief description of each method.

1. *National Safety Council Method*

It is assumed that when both vehicles reach their critical sight distance at the same time, that one vehicle will pass behind the other and stopping is not necessary. If it so happens that the minor street vehicle is traveling too fast, then the major street vehicle may have to slow down or stop.

2. *American Automobile Association Method*

A stopping distance is determined for the major street vehicle based on an assumed speed, deceleration

[1] Institute of Traffic Engineers, TRAFFIC ENGINEERING HANDBOOK, 1950. Pages 384-388.

and reaction time. The maximum stopping distance for the minor street vehicle is computed, based on the stopping distance for the major street vehicle and the sight distance.

3. *American Association of State Highway Officials Method*

This method is similar to Method 2 above, except for different assumptions of reaction time and deceleration.

These methods will not apply at a railroad crossing where it is necessary to assume a constant speed for the train which does not slow down or stop. It is therefore necessary to compute the safe speed of the vehicle so that the driver can either stop or beat the train upon arriving at the critical point and observing a train approaching.

In order to illustrate this method, a typical arterial street railroad grade crossing in Phoenix is used as an example. This crossing is 20th Street and the Southern Pacific Railroad, illustrated in Figure 1. A diagram of this intersection is shown in Figure 2. In this figure Point A is the position of the driver; Point B is where the driver either applies brakes or accelerates to beat the train; Point C is where vehicle stops, clearing train by 20 feet; and Point P is position of driver to safely clear train by 50 feet.

It should be brought out at this time that the extreme danger of a railroad grade crossing where vision is impaired occurs when a driver sights a train and is going at a speed too fast to stop in time, but not fast enough to beat the train. The specific purpose of this report is to compute a speed at which a driver can stop and also beat the train. This is the maximum safe speed.

Minimum Safe Crossing Speeds:

1. The reaction time, R, occurs from Point A to B and the time, t, occurs from Point B to P, as seen in Figure 2.

2. *For the train,*

$$S_1 = V_t\ (t + R)$$
$$S_1 = 44\ t + (44)\ (0.75)$$
$$S_1 = 44\ t + 33$$

3. *Vehicle distance related to train distance*

(a) S_1 = distance of train from impact point.
(b) Distance of vehicle from impact point
(1) In Figure 1, triangle ADF and AEG are similar and.

$$\frac{AD}{AD + 47} = \frac{32}{S_1}$$

$$S_1 \times AD = 32\ AD + 1504$$

$$AD = \frac{1504}{S_1 - 32}$$

(2) Therefore, for a train distance, S_1, the vehicle distance, AE, is

$$S\ (veh) = \frac{1504}{S_1 - 32} + 47$$

Figure 1

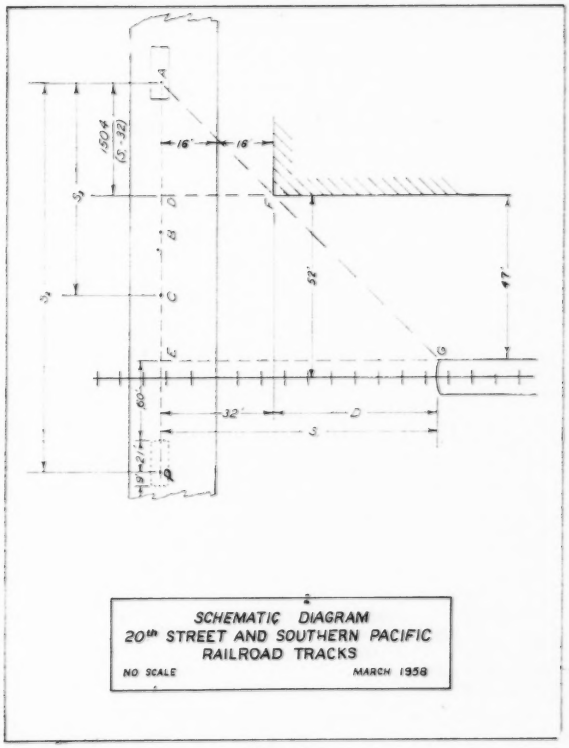

Figure 2

4. *For the vehicle,*

$$S_2 = V_0 t + \tfrac{1}{2}\ at^2 + V_0 R$$

$$\frac{1504}{S_1 - 32} + 128 = V_0 t + \tfrac{1}{2}\ at^2 + V_0 R$$

$$V_0\ (R + t) = 128 + \frac{1504}{S_1 - 32} - \tfrac{1}{2}\ at^2$$

$$V_0 = \frac{128 + \dfrac{1504}{S_1 - 32} - 1.25\ t^2}{t + 0.75}$$

5. *Sample Calculation* ($S_1 = 100$)

(a) $S_1 = 44t + 33$

$100 = 44t + 33$

$$44t = 67$$

$$t = 1.52 \text{ Seconds}$$

$$\text{(b)}\quad V_0 = \frac{128 + \frac{1504}{S_1 - 32} - 1.25\ t^2}{t + 0.75}$$

$$V_0 = \frac{128 + \frac{1504}{100 - 32} - 1.25\ (1.52)^2}{1.52 + 0.75}$$

$$V_0 = \frac{128 + 22.2 - 2.9}{2.27} = 65 \text{ fps}$$

$$V_0 = 44.3 \text{ MPH}$$

$$\text{(c)}\quad S \text{ (veh)} = \frac{1504}{S_1 - 32} + 47 = \frac{1504}{68} + 47$$

$$S \text{ (veh)} = 69.2 \text{ feet}$$

6. The table below shows various values of S_1 and S (veh) for values of V_0.

S_1 (train)	S (veh.)	t (sec.)	V_0 (fps)	V_0 (MPH)
100	69.2	1.52	65.0	44.3
150	59.8	2.66	38.7	26.4
200	56.0	3.80	26.2	17.9
250	54.0	4.93	18.4	12.6
300	52.6	6.07	12.9	8.8
350	51.7	7.20	8.5	5.8

Maximum Safe Stopping Speeds:

1. The reaction time, R, occurs from Point A to B and the braking time occurs over the distance BC, as seen in Figure 2.

2. *For the vehicle,*

$$V^2 = V_0^2 + 2\ d\ s$$

$$S_3 = \frac{-V_0^2}{2\ d} + RV_0$$

$$\frac{1504}{S_1 - 32} + 18 = \frac{V_0^2}{30} + 0.75\ V_0$$

$$\frac{1504}{S_1 - 32} = \frac{V_0^2 + 22.5\ V_0 - 540}{30}$$

$$(S_1 - 32)\ (V_0^2 + 22.5\ V_0 - 540) = (30)\ (1504)$$

$$S_1 = \frac{45{,}120}{V_0^2 + 22.5\ V_0 - 540} + 32$$

3. *Sample Calculation* ($V_0 = 12$ MPH $= 17.6$ fps)

$$S_1 = \frac{45{,}120}{V_0^2 + 22.5\ V_0 - 540} + 32$$

$$S_1 = \frac{45{,}120}{(17.6)^2 + (22.5)\ (17.6) - 540} + 32$$

$$S_1 = \frac{45{,}120}{166} + 32$$

$$S_1 = 304 \text{ feet}$$

4. The table below shows various values of S_1 for value of V_0.

Vo (MPH)	Vo fps)	S_1 (train)	S (vehicle)
12	17.6	304	52.5
13	19.1	209	55.5
15	22.1	133	61.9
20	29.4	77.7	79.9
30	44	51	126.2
40	58.8	42.6	189.0

Results

The results of the calculations for minimum safe crossing speeds and maximum safe stopping speeds are plotted as graphs in Figure 3. The intersection of these two curves is the critical speed, or that speed at which a driver can stop safely and also accelerate and beat the train. As a further explanation, the speeds for both conditions have been labeled in Figure 3 for an S (veh) distance of 59.8 feet. If a driver is traveling over 14.4 MPH at this distance from the crossing and sights a

(Continued on page 36)

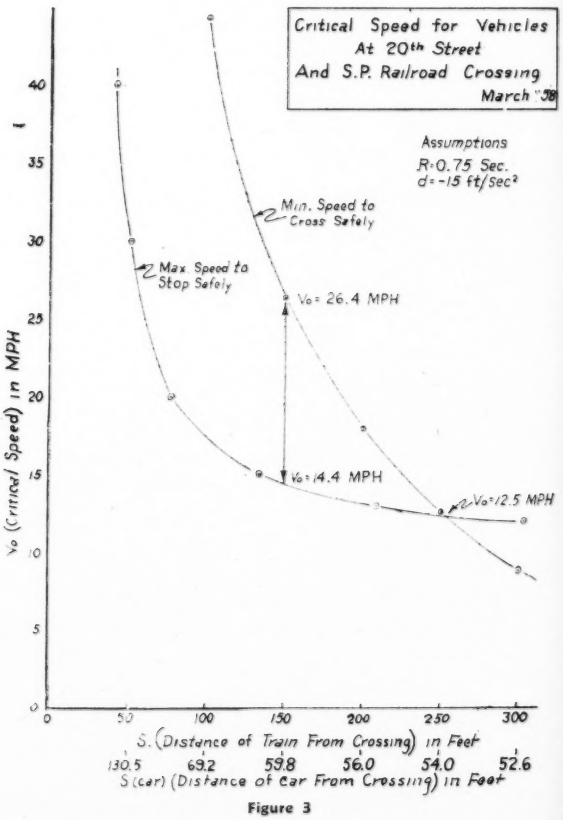

Figure 3

Ohio Turnpike Accident Study

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Traffic and Safety Engineer
Ohio Turnpike Commission

A STUDY HAS BEEN MADE of all accidents experienced on the main traveled lanes of the Ohio Turnpike, between the Ohio-Indiana State Line and the Ohio-Pennsylvania State Line. The period of time covered was the first two years of the Turnpike's operation, from October 1, 1955 through September 30, 1957. The conclusions arrived at as a result of the study should be of interest with the approaching construction and operation of the vast network of the Interstate Highway System, whose characteristics will closely resemble those of the presently operating turnpikes.

That accident information drawn on was in the form of punched tabulating cards covering each accident. Accidents which resulted in no injuries, and with property damage of less than $100.00, were excluded from the study as well as those which occurred at service and toll plazas. The accidents considered in the study numbered 1,383, and occurred on through traffic lanes alone. A huge tabulating sheet was prepared, listing each separate accident, with its exact milepost location and individual accident facts.

Accident frequency and facts are of little use if they are not correctly correlated with usage, so it was necessary to gather information related to vehicle mileage. Again, from the punched tabulating cards, the exact number of vehicle miles experienced for the two year period, between each interchange, was calculated. With the assembled information it was possible to arrive at an accident rate per 100,000,000 vehicle miles for each particular section of the Turnpike between interchanges. (Table 1). The rates ranged from 42.6, found on the section from the Ohio-Indiana State Line to Interchange No. 1, to a high rate of 177.2 for the portion of the Turnpike between Interchanges 11 and 12; and the second high rate of 113.3, found to be between Interchanges 10 and 11. The remaining portion of the study was then devoted to these two high-accident sections. Doubtless, as time permits, other sections of the Turnpike will be closely studied; however, this paper will deal only with the 19-mile portion of the Turnpike between Interchanges 10 and 12.

TABLE 1
OHIO TURNPIKE ACCIDENT RATES

Section	Rate (per 100-million vehicle miles)
00 MP to Int. 2	42.6
Int. 2 to Int. 3	56.6
Int. 3 to Int. 4	66.4
Int. 4 to Int. 5	104.1
Int. 5 to Int. 6	71.4
Int. 6 to Int. 7	88.4
Int. 7 to Int. 8	78.6
Int. 8 to Int. 9	83.7
Int. 9 to Int. 10	64.6
Int. 10 to Int. 11	113.3
Int. 11 to Int. 12	177.2
Int. 12 to Int. 13	76.5
Int. 13 to Int. 14	90.1
Int. 14 to Int. 15	86.4
Int. 15 to Int. 16	97.9
Int. 16 to 241 MP	62.3

Period covered—2 years, Oct. 1, 1955 to Oct. 1, 1957
Type of accident—All accidents: fatal, personal injury, and property damage of $100 and over
Area included—Main travel lanes between interchanges

The 19-mile section extends through the most uneven terrain traveled by the Turnpike as it crosses the State of Ohio. There are numerous cuts and fills, and the Turnpike's largest bridge, that over the Cuyahoga River Valley, is included in this section. Inasmuch as grades, and especially "plus" grades, assume an importance in the results of this study, it is well to note the fact that the Turnpike was constructed with maximum upgrades being held to 2%, and maximum downgrades to 3.14%.

Other important Turnpike structural characteristics are: minimum width between travel lanes—56 ft.; width of outside shoulder 10 ft.; width of inside shoulder—8 ft.; maximum degree of curvature — 2½°; minimum sight distance—900 ft., and a minimum width of 124 ft. between the outside edges of the outside shoulders.

The number of accidents which occurred between interchanges No. 10 and 12 totaled 225. Westbound traffic accounted for 116 accidents, and eastbound traffic registered 109 such occurrences. The accident rates for the westbound and eastbound lanes were 144.2 and 132.7, respectively. (Table 2.) The number of accidents which occurred within each individual mile within the 19-mile section varied considerably.

A separate accident frequency chart, covering the section during the winter months and during the sum-

TABLE 2
OHIO TURNPIKE ACCIDENT FREQUENCY, MP 161 to MP 180

Section	Westbound Accidents	Eastbound Accidents
MP 161 to MP 162	4	2
162 163	5	3
163 164	3	2
164 165	5	4
165 166	2	2
166 167	6	10
167 168	5	17
168 169	3	4
169 170	4	2
170 171	4	4
171 172	7	7
172 173	9	3
173 174	6	4
174 175	10	6
175 176	16	5
176 177	5	5
177 178	9	13
178 179	7	6
179 180	6	10
Total Accidents	116	109
Accident Rate	141.2	132.7

Period covered—2 years, Oct. 1, 1955 to Oct. 1, 1957
Type of accident—All accidents: fatal, personal injury, and property damage of $100 and over
Area included—Main travel lanes between Interchanges 10 and 12

mer months, was prepared. The winter season covered the period from November 1st to May 1st, and the summer season from May 1st to November 1st. (Table 3.) The accident rate established for the winter months was much higher than that for the summer months. The winter season had an accident rate of 206, while the summer months maintained a rate of but 98.

The factor of grade as related to accident locations was then taken into account. Exact locations were plotted along the east and westbound lanes for the entire two-year period, each lane being shown according to its particular grade characteristic (Figure 1.) At this point it became very apparent that grades had a very direct relationship to accidents. Of course this is not new information, but when the grade restrictions are as rigid as those on the Ohio Turnpike it is rather startling.

It was necessary, at this point, to consider what effect pavement conditions, such as "dry," "snowy or icy" and "wet" pavement had upon accident occurrences (Figure 2). Sixty-two per cent of all accidents occurred under "dry" pavement conditions. "Snowy or icy" conditions prevailed during twenty-six per cent of the accident occurrences. "Wet" pavement existed when twelve per cent occurred.

A consideration of light conditions at times of accident occurrences was studied (Figure 3). Often heard is that "dawn" and "dusk" lighting conditions account for a majority of accidents. Careful study of this factor was made. Actually, only six and two-tenths per cent of the accident happenings were at "dawn" or at "dusk." The hours of darkness account for forty-eight per cent, while forty-four per cent of all accidents occurred in the daylight hours. One and eight-tenths per cent of the occurrences were experienced at night in areas that were illuminated by roadway lights.

Rear-end type accidents were located along the section with the existing grade characteristics displayed (Figure 4). Here, again, a close relationship between frequency of accidents and grade characteristics was readily discernible. Sixty-two (or 28%) of the two hundred and twenty-five accidents of all types reported for the section

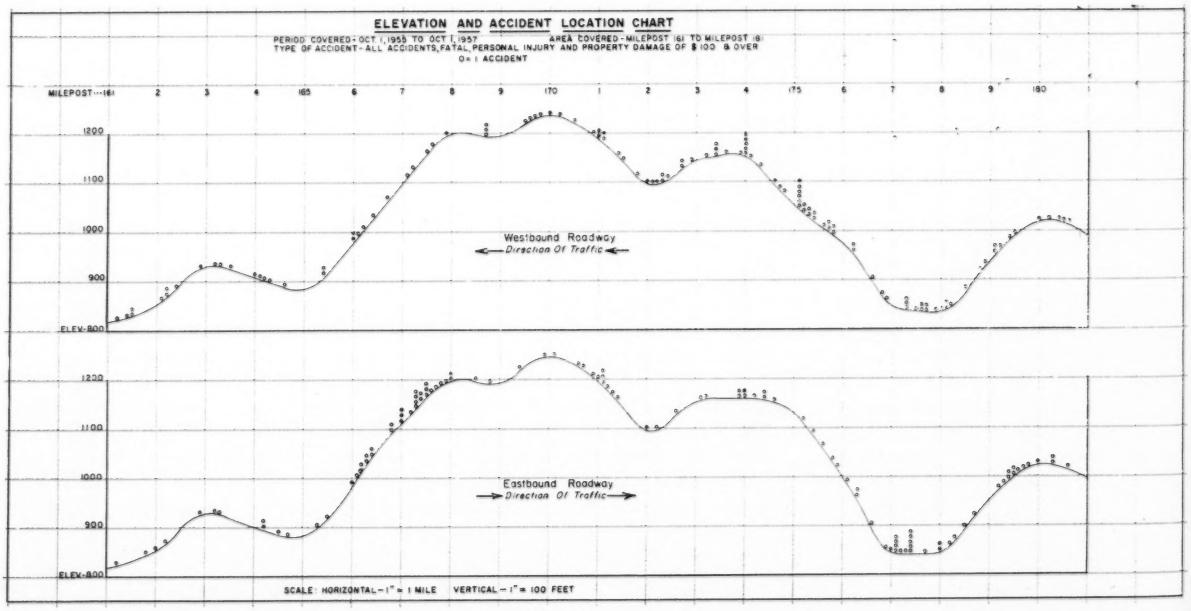

ELEVATION AND ACCIDENT LOCATION CHART
PERIOD COVERED - OCT 1, 1955 TO OCT 1, 1957
AREA COVERED - MILEPOST 161 TO MILEPOST 181
TYPE OF ACCIDENT - ALL ACCIDENTS, FATAL, PERSONAL INJURY AND PROPERTY DAMAGE OF $100 & OVER
0 = 1 ACCIDENT
MILEPOST 161
ELEV. 800
Westbound Roadway
Direction Of Traffic
Eastbound Roadway
Direction Of Traffic
SCALE: HORIZONTAL - 1" = 1 MILE VERTICAL - 1" = 100 FEET

Figure 1

were of the rear-end collision variety. Taking the sixty-two rear-end collision acidents alone, 5% of them resulted in fatalities, 60% caused personal injuries, and 35% were property damage accidents. These percentages illustrate the severity of the rear-end collision type accidents.

Summary

In conclusion, the following informational facts are established from the study as far as it has progressed at this time:

I Accident rates have a close relationship to any highway facility's structural characteristics.

II Flat, level, terrain through which a highway facility passes is conducive to very low accident frequencies.

III Accident rates during winter months may be twice as high as those for summer months. Undoubtedly, weather and the increased number of hours of darkness during the winter months contribute to this difference. Increased attention to pavement conditions and additional assignment of enforcement personnel are justified.

IV Plus-grades, even when held to 2%, produce traffic accidents. Heavy commercial vehicles consistently travel at lower than normal speeds when ascending even a 2% grade. These, lower than normal commercial vehicle speeds, set the stage for: (a) increased passing movements; with their subsequent judgment demands upon the driver of the passing vehicle; (b) rear-end collisions, when drivers of passenger car are fatigued, sleepy, or inattentive, and (c) rear-end collisions when commercial vehicles have inadequate rear-end lighting.

Corrective measures in relation to accident-producing plus-grades include the following:

1) Reduce upgrade per cents at the highway design stage.
2) Construct an additional lane for slow moving vehicles.
3) Install special warning signs, calling attention to the fact that there are slow-moving vehicles on the grade.

TABLE 3

OHIO TURNPIKE ACCIDENT FREQUENCY, MP 161 to MP 180
WINTER AND SUMMER

Section	Winter Accidents	Summer Accidents
MP 161 to MP 162	4	2
162 163	3	5
163 164	3	2
164 165	5	4
165 166	2	2
166 167	10	6
167 168	9	13
168 169	4	3
169 170	3	3
170 171	4	4
171 172	7	7
172 173	8	4
173 174	5	5
174 175	7	9
175 176	11	10
176 177	7	3
177 178	14	8
178 179	7	6
179 180	10	6
Total Accidents	123	102
Accident Rate	206	98

Period covered—2 years, Oct. 1, 1955 to Oct. 1, 1957
Winter: Nov. 1 to May 1
Summer: May 1 to Nov. 1
Type of accident—All accidents: fatal, personal injury, and property damage of $100 and over
Area included—Main travel lanes between Interchanges 10 and 12

ROAD CONDITIONS

Type of Accidents - All Accidents, Fatal, Personal Injury and Property Damage of $100 and Over.

Area Studied - Main travel lanes between Interchange #10 (Milepost 161) and Interchange #12 (Milepost 180.)

Period - 2 Years - October 1 1955 to October 1, 1957.

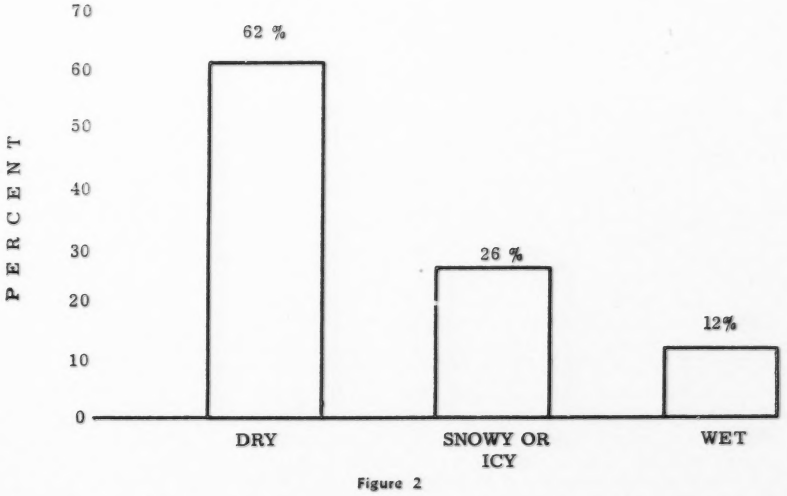


Figure 2

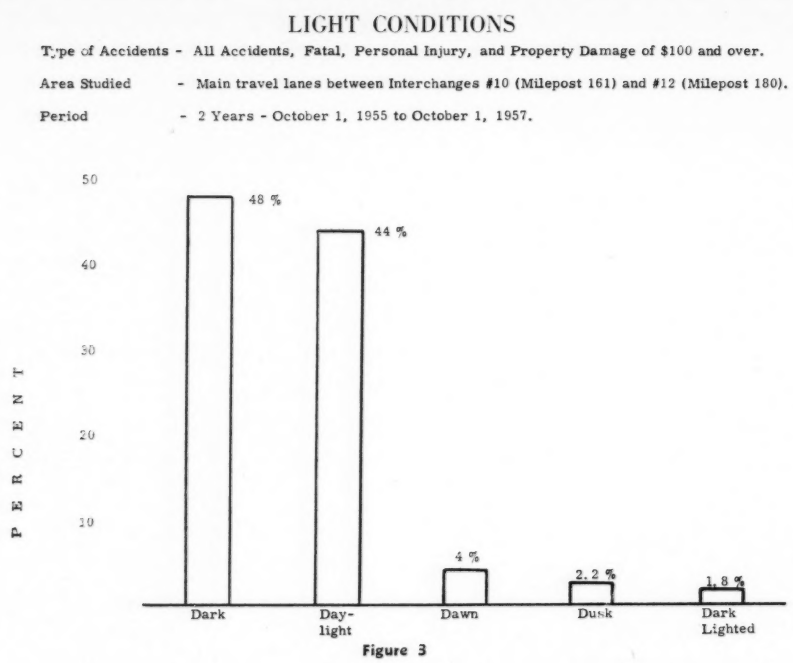


Figure 3

4) Assign more enforcement personnel to the area.
5) Install roadway lighting at grade locations.

Downgrades (held to 3.14% on the Ohio Turnpike) do not contribute to accidents as upgrades do. Reasonable minus grades experience accident rates that are slightly higher than those recorded for level sections.

Horizontal curvature (held to 2½° on the Ohio Turnpike) does not appear to contribute to traffic accidents.

V Pavement conditions "dry," "snowy or icy," and "wet" do not play a large part in accident frequency, if a prompt and thorough snow and ice treatment program is employed.

VI Regardless of the high volume of traffic during the daylight hours more accidents occur during hours of darkness. Many factors, of course, enter into the cause for this condition; however, it does point up the fact that fully reflectorized signs and delineators, reflectorized centerlines and edgelines, more and improved roadway lighting, and more night enforcement patrol activities must have a high priority in the traffic safety program.

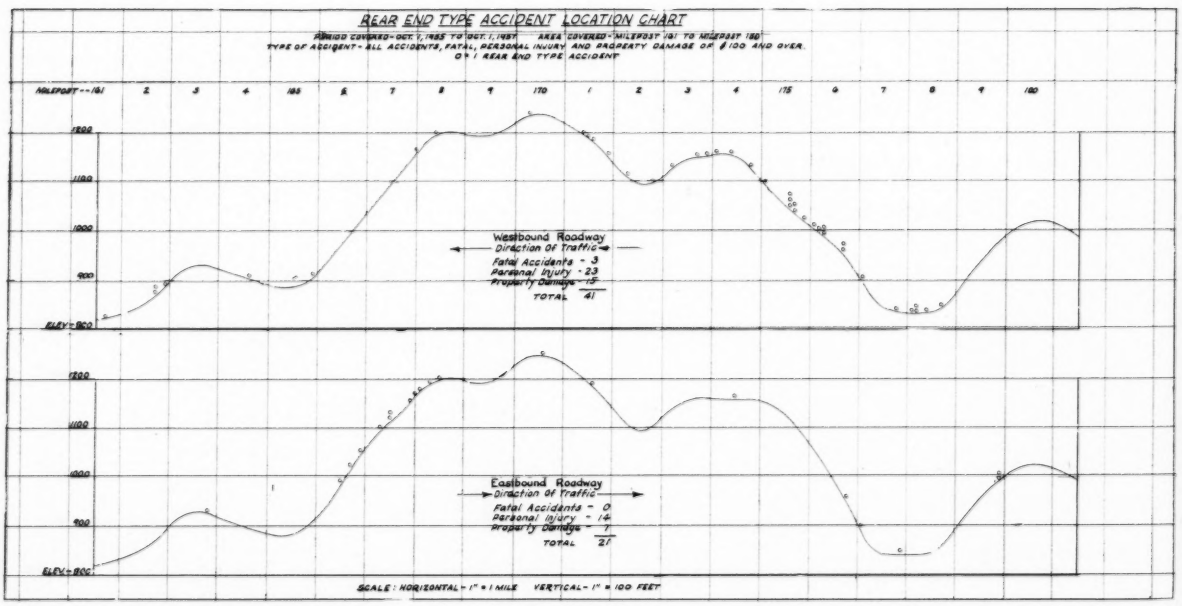

REAR END TYPE ACCIDENT LOCATION CHART
PERIOD COVERED - OCT. 1, 1955 TO OCT. 1, 1957 AREA COVERED - MILEPOST 161 TO MILEPOST 180
TYPE OF ACCIDENT - ALL ACCIDENTS, FATAL, PERSONAL INJURY AND PROPERTY DAMAGE OF $100 AND OVER.
O'S I REAR END TYPE ACCIDENT
MILEPOST - 161
Westbound Roadway
Direction Of Traffic
Fatal Accidents - 3
Personal Injury - 23
Property Damage - 15
TOTAL 41
Eastbound Roadway
Direction Of Traffic
Fatal Accidents - 0
Personal Injury - 14
Property Damage - 7
TOTAL 21
SCALE: HORIZONTAL - 1" = 1 MILE VERTICAL - 1" = 100 FEET

Figure 4

Training Opportunities

July 7-19 — INTRODUCTION TO COMPUTER METHODS FOR HIGHWAY AND TRAFFIC ENGINEERS—
To be held at Yale University, New Haven, Connecticut, under the joint auspices of the Yale Bureau of Highway Traffic and the Institute of Transportation and Traffic Engineering of the University of California. Tuition $150. Registration limited. For information, write: Director, Bureau of Highway Traffic, Strathcona Hall, Yale University, New Haven, Conn.

October 29-30 — COMPUTER APPLICATIONS SYMPOSIUM—
The Fifth Annual Computer Applications Symposium, sponsored by Armour Research Foundation, will be held in Chicago October 29 & 30. For information, write: Armour Research Foundation of Illinois Institute of Technology, 10 West 35th Street, Chicago 16, Illinois.

Traffic News

Seminar Program Approved by Columbus Participants; Sacramento to Be Next

The first Freeway Operations Seminar sponsored by the Institute of Traffic Engineers was held May 23-25 in Columbus, Ohio, with a total of 133 persons registered. A full program of morning, afternoon and evening sessions was scheduled, and the attendance at each was nearly 100 per cent.

In the absence of President Havenner, Vice President Wetzel, who is chairman of the Steering Committee planning the seminars, opened the meeting by reading a message from the President. This message included the following statement of purpose and need for the seminar program:

"In sponsoring the Freeway Operations Seminars, the Institute of Traffic Engineers hopes to offer a common meeting ground for the several areas of responsibility involved in the problems related to the safe and efficient movement of traffic upon controlled access highways and in the problems created by freeways on connecting and parallel routes.

We recognize that traffic engineers comprise only one of the several professional groups interested in this problem and that the successful operation of freeways depends upon the coordination and mutual understanding of all groups and professions represented by our target audience.

Experience in those cities and states where substantial mileage of controlled access facilities is already in operation indicates that freeways represent an entirely new classification of highway facility. Well established concepts of design, signing, enforcement, regulations and control, entirely suitable and successful on conventional streets and highways, have been found to be inadequate to meet the impact of freeways. New concepts in these fields are emerging as recognition of new problems develops.

At this conference we hope that those of you who have not yet experienced the impact of a freeway upon your job, your responsibility, and your concepts of highway operations, will take a broad look at some of the challenges of freeways through the discussion leadership of a number of professional men who have experienced the development and opration of controlled access facilities in their jurisdictions. We hope that you will benefit from this experience to the extent that you will be better prepared to perform your share of the responsibility of achieving the maximum functional performance from what promises to be the greatest surface transportation system ever conceived. Surely, the National System of Interstate and Defense Highways is destined to become one of the engineering wonders of the world. Unlike the static grandeur of most engineering wonders, the Interstate System will ultimately be judged upon the dynamics of the system . . . upon its ability to provide for the safe movement of persons and goods with speed and efficiency, in quantities, and over distances never before achieved."

The Steering Committee is looking forward to the second Seminar, scheduled for Sacramento June 16, 17 and 18. Planning for this affair has been in the hands of George M. Webb, Traffic Engineer for California, assisted by a local group including: Rudy Israel, Karl Moskowitz, Henry Case, Roy Mathews, Dudley Stevens, and O. C. Hinton. The Seminar, which will be held at the Hotel El Dorado, will immediately precede the annual meeting of the Western Section. Designed to draw principally from a 300-mile radius around Sacramento, it is likely that many Western Section members will want to attend both meetings. The Steering Committee points out, however, that other Seminars are planned by both the Los Angeles area and the Seattle-Portland area for 1959.

All of these Seminars are part of a series made possible by the cooperation of the Automotive Safety Foundation. Carlton C. Robinson has been serving as secretary of the Steering Committee, and as such has had a large part in arranging the program.

Vice President E. G. Wetzel calls the Columbus meeting to order.

O. K. Normann talks to the Seminar at Columbus.

B. W. Marsh illustrates a point before the Columbus Seminar.

E. R. Ricker talks at Columbus about operating problems on a controlled access roadway.

Luncheon for Columbus Seminar. Note speakers D. W. Loutzenhiser, E. R. Ricker, A. F. Malo, and W. H. Polkinghorn (Detroit Police) in the foreground.

Among the ITE members at Columbus were (l. to r.) Arnold Fisch, Armand Keeley, Michael Gittens, Jim Darrell and Roger Chandler.

Radio Control of Traffic Signals Begun in Wayne County

The Wayne County (Mich.) Road Commission has placed in operation a new system of radio traffic control on James Couzens Superhighway for a distance of approximately four miles between Wyoming Avenue and Base Line Road. This radio control system takes the place of interconnecting cables that normally are required to operate groups of traffic signal installations and to make the necessary changes in signal operation for the most efficient movement of traffic along a highway as traffic volumes vary from time to time each day.

Although a few similar systems have been used in other parts of the country, the Wayne County system is the first to operate in the ultra-high frequency (U.H.F.) range. This simplifies operation and minimizes possible radio interference.

James Couzens Superhighway was selected for this initial installation because the extremely heavy traffic it carries from the end of the John Lodge Expressway offers favorable opportunity for signal timing tests and the location, being close to the Road Commission signal maintenance shop, is convenient for observation and study.

The equipment consists of a central control panel and traffic signal programmer located at the Road Commission signal headquarters on Wyoming Avenue, Detroit. This central controller codes the required signal changes into audio tones which are sent by telephone line to a radio transmitter atop the Penobscot Building. From there the tones are transmitted to radio receivers attached to each traffic signal installation where the tones actuate switches to change the operation of each signal controller incorporated in the radio controlled system. This equipment requires no alteration in the standard traffic signals already in use by the Road Commission. It is only added to the existing equipment as traffic conditions show the need.

There are several important advantages, the Commission believes, in such a radio control system, compared to overhead or underground cables normally required for signal interconnection. Costs to install interconnecting cables would be at least two to ten times more than installing the radio system in this metropolitan area. The radio system is much more flexible than cables and it changes traffic signal operation simply by switching from one tone combination to another. Radio can reach directly to distant points that may be impractical to reach by cable. By sending continuous tone signals, radio synchronizes groups of traffic signal installations perfectly and eliminates necessity for daily patrolling of roads by maintenance crews, as is required now to insure proper synchronization of signals at related locations.

Radio provides a central traffic signal control that, with only a small addition of equipment, will provide coverage of any point in the Wayne County area. Such central control can be programmed automatically or operated manually by push-button.

Presently, this radio system is being applied only to intersections along James Couzens Superhighway until adjustments in the equipment can be made. Thereafter, it will be extended gradually to highways throughout Wayne County as traffic demands require.

Cost of the entire radio control installation including central control panel, radio transmitter and seven intersection radio receivers is about $18,000, of which approximately one-third is for the permanent control panel and transmitter that will not require duplication with further expansion. The equipment operates on 959.7 megacycle frequency and this U.H.F. channel has been allocated to the Road Commission exclusively for traffic signal control. No other stations in this area can operate on this frequency, thereby preventing any possibility of radio interference that otherwise might be experienced.

Ford Foundation Supports County Officials Association

A five year grant of $160,000 has been awarded to the National Association of County Officials by the Ford Foundation, it has been announced by Mark S. Johnson, president of NACO.

The grant will be administered by the association's newly-created educational corporation—Local Government Education and Research Inc., Johnson said.

The Ford Foundation funds will be used "to help provide leadership in assisting urban counties better to discharge their metropolitan area responsibilities; to help strengthen the service programs of state associations of county officials; to establish a central clearinghouse for data on county government; to improve the quality of publications in the field of county government; to conduct research and disseminate information on county problems; and to help raise the level of annual conference programs of the National Association of County Officials," the Ford Foundation stated.

Payment of the grant will be made roughly as follows: $60,000 in 1958; $40,000 in 1959; $30,000 in 1960; $20,000 in 1961; and $10,000 in 1962. During this time NACO plans to use every effort to increase its revenues, so that by 1963 it can support on its own the educational activities carried on by Local Government Education and Research, Inc.

Commenting on the temporary grant, Johnson pointed out, "In the past decade we have turned increasingly to the county as the administrative unit for a host of governmental functions. This is especially true of our rapidly expanding urban areas, beset with a host of problems related to the mushrooming population. In rural areas, also, the counties responsibilities are increasing.

"National leadership is needed to help prepare counties to meet their responsibilities. With the assistance of this grant we are confident that the National Association of County Officials can provide this leadership."

NACO is the national association which represents elected and appointed county officials in 47 states. In May of 1957, the 22-year old association was reorganized and hired its first full time Executive Director. In addition to its member state associations in 43 states, NACO has three functional affiliates: the National Association of County Engineers; the National Association of County Clerks and Recorders and the National Association of County Treasurers and Finance Officers. General Offices are maintained at 1721 De Sales Street, N. W., Washington 6, D. C.

Median Fence Used in Washington to Cut Glare

The Washington State Highway Department has recently installed two sections of a combination redwood and steel fence in the median to cut headlight glare and thus reduce night driving hazards. The fencing, a U. S. Steel Product, is of steel laced with redwood slats.

The no-glare fence near Fort Lewis is on a curved stretch south of Tacoma on the new divided highway which is one of Washington's new sections built under the Federal highway program. Another several hundred feet of the fencing is in place on Washington State Highway 14, where a different hazard existed. Drivers saw the light of oncoming cars and naturally assumed they should also travel straight ahead. However, if they did they would plunge down a steep embankment since their lanes approaching a new interchange actually turn far to the right. Here the fence serves as a traffic direction guide for night drivers.

Another use of the no-glare fence is planned by the traffic division of the Washington State Highway Department in connection with the construction of a new three-level interchange at Capitol Lake on the Olympia Freeway, and similar installations will be made on future limited access highways where the problems of glare and driver error are encountered.

Hanson Named Winner Of "Getting Results" Competition for 1957

Pavement paint and signs costing less than $100 were the simple ingredients used by the Peoria traffic engineer to transform a dangerous and confusing street intersection into one of the city's safest.

Novel use of common traffic controls won top recognition in the 1957 national traffic engineering competition sponsored by the Association of Casualty and Surety Companies for Daniel J. Hanson (Assoc. Mem., ITE), former Peoria traffic engineer who now holds a similar post with the newly-established St. Louis County (Mo.) Traffic Commission.

A framed certificate and a cash award of $100 were presented to him for submitting the winning example among those published last year in the "Getting Results Through Traffic Engineering" program.

Mr. Hanson's winning recommendation was for improving the physical layout of a "T" intersection at Moss Avenue and Union Hill in Peoria which handles 13,000 vehicles per day. Lack of pavement markings, allowance of parking and inefficient traffic control resulted in much confusion at the intersection, where seven accidents occurred in a 19-month period.

Eastbound Moss Avenue traffic desiring to turn right onto Union Hill was permitted to make this movement without stopping by means of a "Right Turn Permitted Without Stop" sign. This change allows 43 per cent of the eastbound traffic to move freely. The eastbound through traffic is now stopping at the stop line painted on the pavement. A supplemental sign informs approaching motorists to "Stop at Line." In addition, a reflectorized pavement marking island and centerline markings were used to efficiently channel all traffic at this location, and curb parking that impeded traffic was restricted.

In a 19-month period following installation of improvements, only one property damage accident occurred at the intersection and traffic movement has been greatly improved.

Major factors considered by the program judges include originality, effectiveness of a project in reducing accidents and traffic delay or congestion and the relationship of the value of benefits to the cost of the improvements made.

Judges of the 1957 competition were representatives of leading organizations interested in traffic safety: M. L. Shadburn, American Association of State Highway Officials; Ray Ashworth, International Association of Chiefs of Police; Thomas J. Seburn, Yale Bureau of Highway Traffic; Edward L. Smith, National Safety Council, and William J. Miller, Jr., Institute of Traffic Engineers.

The program, which was begun in 1938, is open to all traffic engineers, highway officials and others interested in improving traffic safety. Entries may be sent at any time during the year to the Accident Prevention Department, Association of Casualty and Surety Companies, 60 John Street, New York 38, New York.

New Publications

Traffic Behavior As Related to Several Highway Design Features

Bulletin 170, Highway Research Board, 2101 Constitution Ave., Washington 25, D.C., January 1958, 76pp., $1.60

This bulletin contains four papers on the relationship between traffic behavior and various highway design features, as presented at the 36th Annual Meeting of the Highway Research Board.

The first paper, by Charles J. Keese and Robert H. Schleider, correlates design factors and operational characteristics of the Gulf Freeway in Houston, Tex., and the Central Expressway in Dallas.

The second paper, by M. D. Shelby and P. R. Tutt, reports the results of vehicle speed and placement surveys in Texas on (a) two-lane rural highways, (b) rural bridges, and (c) an urban grade-separation structure with and without an obstruction on the narrow (6-ft) shoulder.

The third paper, by Wesley R. Bellis, reports a New Jersey study of the frequency and character of use of shoulders along state highways, both for leisure and emergency stops.

The fourth paper, by Asriel Taragin, reports on a cooperative study by the Bureau of Public Roads and nine western states of driver behavior as related to shoulder type and width on two-lane rural highways.

Proceedings

25th Anniversary Annual Meeting, American Bridge, Tunnel and Turnpike Association, P. O. Box 748, White Plains, New York. 1958. 180 pp. $5.00

The Proceedings of the meeting held in Chicago in October, 1957, contain a number of interesting papers and reported discussions. Of particular interest are reports of sessions dealing with safety and operations on high-speed facilities and with motorists needs on controlled access roads.

Immediate Needs And Long Range Objectives

Report of the 1957 Public Officials Traffic Safety Conference, President's Committee for Traffic Safety, 532 Pennsylvania Building, Washington 4, D.C. (Limited supply).

This report is the final version of the several workshop and special reports considered and approved at the December, 1957 meeting held in Washington. Added by the staff have been two large charts showing most commonly reported state and city needs in the traffic safety field.

Speed Regulation

Committee on Speed, Traffic and Transportation Conference, National Safety Council, 425 N. Michigan Avenue, Chicago 11, Illinois. 1958. 36 pp.

This report summarizes the most recent thinking on the subject of speed regulation, as well as the influence of speed on traffic operation and management. Sections are devoted to such subjects as speed as a factor in accidents, legislation, education, engineering, enforcement and speed measuring equipment.

Conclusions are stated in the first section of the report in a list of 21 specific points. Of interest to engineers is the recommendation that warrants need to be established for speed zones, and the emphasis throughout on the importance of speed zoning.

A General Method for Estimating Through Traffic In A Road Network

R. Brenner, J. H. Mathewson, and D. L. Gerlough. Reprint No. 58, Institute of Transportation and Traffic Engineering, University of California, Los Angeles, California. 1958. 48pp. (Reprinted from *Highway Research Abstracts*).

This paper re-examines the license plate method of estimating through traffic in a street or highway network. The paper suggests mathematical formulae which can be used to analyze the flow figures obtained on a sampling basis, obviating the necessity of continuous observation. Also described is a procedure for matching license plate numbers by the use of a high-speed digital computer. These two proposals suggest that the license plate method may have greater potential usefulness than previously supposed.

Coming Events

September 16-20 — FOURTH INTERNATIONAL STUDY WEEK IN TRAFFIC ENGINEERING— Copenhagen, Denmark. Contact: World Touring and Automobile Organization, 32 Chesham Place, London, SW1, England.

September 28 - October 1 — AMERICAN PUBLIC WORKS ASSOCIATION— Muehlebach Hotel, Kansas City, Mo. Contact: APWA, 1313 E. 60th St., Chicago, Ill.

October 13 - 15 — AMERICAN TRANSIT ASSOCIATION— Roosevelt Hotel, New Orleans, La. Contact: ATA, 292 Madison Ave., N.Y.C.

October 13 - 17 — AMERICAN SOCIETY OF CIVIL ENGINEERS— National Convention, Statler Hotel, New York City. Contact: ASCE, 29 W. 39th St., N.Y.C.

October 20-23 — INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION— Sheraton Hotel, Philadelphia, Pa. Contact: IMSA, 130 W. 42nd St., N.Y.C.

October 20-24—NATIONAL SAFETY CONGRESS Conrad Hilton, Congress and other hotels, Chicago, Ill. Contact: NSC, 425 N. Michigan Ave., Chicago 11, Ill.

October 26-31—INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE — Hotel Fontainebleau, Miami Beach, Fla. Contact: IACP, 618 Mills Bldg. N.W., Washington 6, D.C.

November 10 - 14 — INSTITUTE OF TRAFFIC ENGINEERS— 28th Annual Meeting, Deauville Hotel, Miami Beach, Florida. Contact: ITE, 2029 K St.,NW, Washington 6, D.C.

November 28-December 5—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS— Annual Meeting, Sheraton-Palace Hotel, San Francisco, Calif. Contact: AASHO, National Press Bldg., Washington 4, D.C.

November 30 - December 3 — AMERICAN MUNICIPAL ASSOCIATION — Hotel Statler, Boston, Mass. Contact: AMA, 1625 H Street N.W., Washington 6, D.C.

New Appointments

McCracken Named Vice President By Liberty Mutual

Dwight M. McCracken (Mem., ITE) has been promoted to the position of vice president of Liberty Mutual Insurance Company. He is manager of the company's Motor Transport Department and Traffic Safety Development, with headquarters in the company's Boston home office.

McCracken, who received his B.S. degree in 1930 from U.C.L.A. and Boston University and his Master's degree in 1931 from Harvard University's Bureau of Street Traffic Research, started with Liberty Mutual in May, 1935 as highway safety supervisor. In 1939 he was named director of traffic engineering and safety bureau and in 1945 became manager of the company's motor transport advisory board.

The author of several published books on traffic control and traffic safety problems, McCracken belongs to the Naval Order of the United States, and is a member of the Harvard Faculty Club and the Wellesley Club in addition to the Institute of Traffic Engineers.

During World War Two, he was instructor in War Traffic Control for the F.B.I. in 1942 and from 1943 to 1945 was a commander in the U. S. Coast Guard Reserve.

Hutchison Appointed Ass't General Manager In Los Angeles

Alexander L. Hutchison (Mem., ITE) has been appointed Assistant General Manager of the Los Angeles Department of Traffic. He thus assumes the former duties of S. S. (Sam) Taylor, who became General Manager following the resignation of Lloyd Braff.

Hutchison has worked in various capacities with the California State Division of Highways since 1938. From 1944 to 1949 he was affiliated with the Traffic Department of the Los Angeles Area Office of the Division of Highways. From 1949 to 1955 he was Assistant District Engineer in charge of the Traffic Department for District 7, comprising the three counties of Los Angeles, Orange and Ventura. In 1955 he was transferred to the Advance Planning Department of the Division of Highways, being in charge of that department until the present time.

Alexander L. Hutchison

He is an active member of the Institute of Traffic Engineers, and past president of the Western Section of the Institute, a graduate of the Yale University Bureau of Highway Traffic, and a licensed Civil Engineer of the State of California.

Coyle Enters Consulting Field in N. Y. C.

Lewis R. Coyle, (Assoc. Mem., ITE) has joined the staff of Tippetts-Abbett-McCarthy-Stratton in New York City. In this position he has established residence in Plainfield, New Jersey, which was his boyhood home.

Coyle had been Traffic Planning Engineer for the Baltimore Department of Traffic since 1952, and had earlier worked for the town of Bloomfield (N. J.) and for another firm of consultants.

A civil engineering graduate of the University of Iowa, Coyle received a certificate from the Yale Bureau of Traffic Engineering in June, 1952.

Shreve Moves to Long Beach from Contra Costa County

Frank T. Shreve (Jun. Mem., ITE) has become Assistant Traffic Engineer in the City of Long Beach. Previously he had held a similar position in Contra Costa County, California.

Shreve had been engaged in highway and traffic work in and around Oakland and Martinez (Contra Costa

County) California, ever since graduation from college. He attended City College of San Francisco and Heald Engineering College, where he received his degree. He became a Junior Member of the Institute in 1957.

Evans Named Assistant Traffic Engineer in Salt Lake City

Robert Evans (Jun. Mem., ITE) has accepted a position as Assistant Traffic Engineer in Salt Lake City, Utah, assuming his new duties late in April.

Evans, who had for the past three years been associated with Bruce Campbell and Associates, the Boston consultants, had earlier had city experience in Providence where he worked three years in the traffic engineering department.

A graduate of Roger Williams Junior College, Evans has been a Junior Member of the Institute since June, 1957.

Strictly Business

New Road Marking Device Developed By Veon

A new machine, capable of laying down more than a dozen times the length of traffic lines done by present type applicators, was introduced recently by the Veon Chemical Corporation, of Long Island City, New York. The new Perma-matic Liner permits 25,000 lineal feet of dividing line to be put down in a normal working day, as compared to 2,000 feet averaged by other type applicators.

One man, mounted on the machine, regulates the flow of the marking compound, the width of the line, and the length of each section of line. Reflector beads, mixed within the compound can also be spread along the top of the dividing line in a simple operation performed by the operator.

In a demonstration given to officials of the engineering and traffic departments of New York City, a ten-block stretch of busy Franklin Delano Roosevelt Drive was marked with Perma-Line, the thermo-compound street marking material also developed by Veon.

In the New York test, the Perma-matic Liner was set to mark eleven-foot intervals along the route. By the time one section was put down, the previous section was practically dry. It took less than eight minutes until normal traffic was allowed to pass over the markings.

Unlike paint, Perma-Line does not come packed in cans. The compound comes from the Veon plant in 25 pound bricks, automatically chopped and melted to liquid form at the site of its use. From the master kettle (on a truck used to tow the applicator), the compound is fed into the applicator where it is stirred, thinned, and conditioned before being adhered to the road surface.

The Perma-matic Liner operator controls the whole operation from his seat on the machine, by means of sound-powered phones rigged between the driver of the truck, and himself.

Engineering Firm Moves Its Offices

Parsons, Brinckerhoff, Hall & Macdonald moved on May 5th, to larger offices on the 23rd and 24th floors of 165 Broadway.

This firm, established in New York City in 1885, has always maintained headquarters in downtown Manhattan. For the past ten years, the firm has occupied offices in three adjoining, small buildings on lower Broadway. It is anticipated that the new and larger quarters will provide greater convenience and efficiency.

Tassco Publishes Brochure on New Sheet Sign

Traffic and Street Sign Co., Newark, N. J., has just published a brochure containing installation procedures, bid specifications and general information on its new increment sheet sign.

The increment sheet sign consists of aluminum increment sheets hung vertically on a supporting frame. The fact the signs can be made in this manner in any size and width makes them of particular value in the large signs required on major highways, expressways and turnpikes. Ground signs are supported on round tapered aluminum posts secured to footings by anchor bolts. Overhead signs may be suported on tubular aluminum structures. Full details on the construction, methods of erection, wind loadings and other specification procedures are contained in the 16-page booklet. Copies available on request—Brochure 58R—TASSCO, 84 Foundry Street, Newark 5, New Jersey.

New Booklet of Ideas on Revitalizing Downtown

A new booklet, "250 Best Ideas from Downtown Idea Exchange," has just been issued by the Downtown Idea Exchange. It is a collection of over 250 specific ideas on action which can be taken to improve the downtown areas of our cities. The ideas are in six major categories: 1) Ideas on Improving Downtown, 2) Ideas on Getting Parking Action, 3) Ideas for Promoting Downtown, 4) Ideas on Eliminating Traffic Jams, 5) Ideas to Boost Mass Transit, and 6) General Ideas.

The booklet was prepared for businessmen, professional men and civic officials who are seeking idea stimulation to aid them in their work of strengthening downtown. The booklet is priced at $1.95 per copy. Orders for 10 or more copies get an additional 10% discount. They may be obtained from Downtown Idea Exchange, 125 East 23rd Street, New York 10, N. Y.

Downtown Idea Exchange is an independent organization devoted to redeveloping and promoting downtown. It publishes the twice-monthly bulletin titled *Downtown Idea Exchange* which extensively covers news and ideas about action taken to strengthen downtown. Downtown Idea Exchange also issues Special Studies, research reports and analyses of downtown trends.

New Data Book on Parking Lots

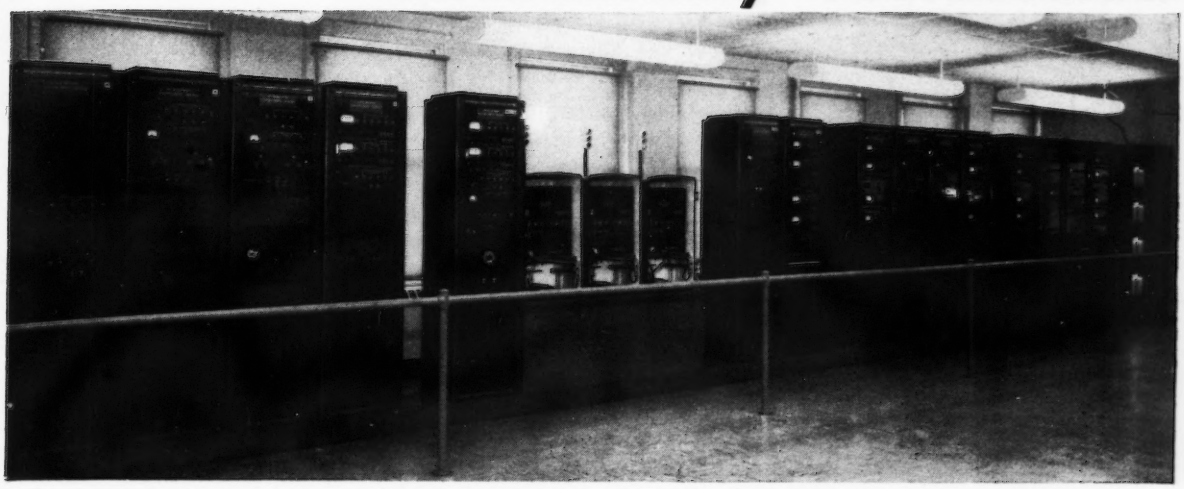
Better parking lot planning for passenger cars, trucks and busses is the subject of new 32-page data book, "Parking Techniques," by Harris Barrier, Inc., P. O. Box 5826, Indianapolis 23, Ind.

The book is a guide for designing parking lots of any size or shape for commercial, industrial and institutional use. Nineteen diagrams show space allocations, using the three common parking angles—45, 60 and 90 degrees. Minimum and optimum dimensions for each arrangement are outlined.

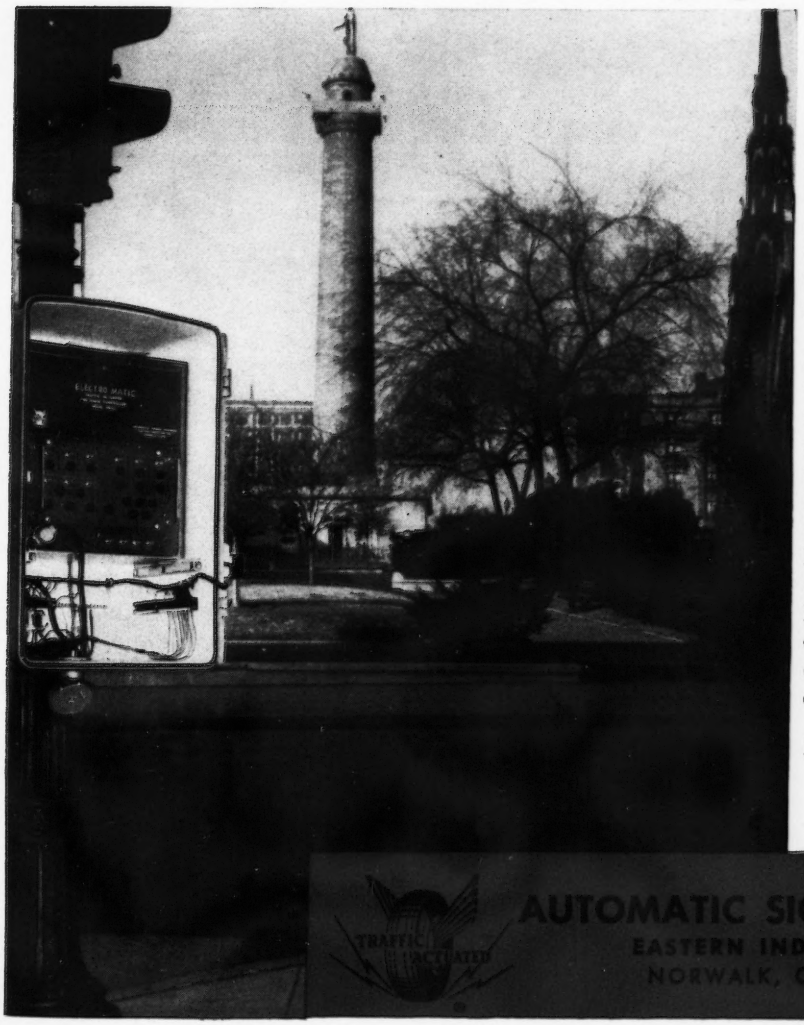
Featured in the data book is the firm's complete line of engineered Har-Bar parking barriers. The barriers may be anchored in any type surface to form a straight or curved line of any desired length. They permit orderly driver parking in assigned spaces; protect adjacent buildings, fencing, lawn, trees and shrubbery.

In addition, the book lists Harris Barrier representatives who offer a nationwide parking lot planning service.

800 BALTIMORE Traffic Signals Electronically Coordinated



ELECTRO-MATIC® PR SYSTEM unplugs traffic bottlenecks



There's something noticeably new in Baltimore — traffic moves, and in orderly fashion, too. In a few short years, Transit-Traffic Commissioner Henry A. Barnes, has turned Baltimore, which had been called "the city with the most antiquated signal system of its size," into a city that boasts the most modern, efficient signal system obtainable.

Baltimore's PR System is an advanced combination of modern electronics. Radar Detectors are used to sample key traffic flows for the centrally located battery of Electro-Matic Masters shown above. The highly developed computing circuits of the Masters analyze this flow data and send to the 800 all-electronic PR Locals throughout the city the necessary instructions to set up the most effective timing pattern for traffic conditions of the moment.

For details write for Bulletin E-224B.

AUTOMATIC SIGNAL DIVISION
EASTERN INDUSTRIES, INC.
NORWALK, CONNECTICUT

How optically flat reflective sheeting keeps entire sign visible in any weather

With the ever-growing volume of travel on our highways, it is increasingly important that traffic signs function at their highest level at all times . . . especially at night and in bad weather when the need for visibility is greatest.

Nighttime visibility of traffic signs through reflectivity has been an accepted fact for quite some time. But weather remains an enemy of most traffic signs . . . even reflective ones. That conditions of rain, snow, fog and the like curtail visibility is no secret. The "fair weather" sign, even under such conditions as a heavy dew, loses as much as 95% of its reflective quality.

Optically flat "Scotchlite" Reflective Sheeting, however, stands out in any weather. This is the sign material whose reflective elements are completely protected by a durable coating that not only guards the sign surface, but minimizes the distortion effects of weather.

No blackout in water

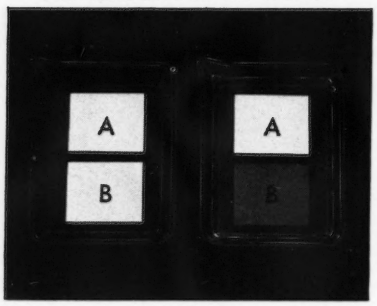


Fig. 1. The pan on the left holds two reflective samples. "A" is optically flat "Scotchlite" Sheeting; "B" is an exposed lens material. When dry, both reflect. In the pan on the right, one inch of water covers both samples. While "Scotchlite" Sheeting loses little of its designed reflectivity, sample "B," with its optical characteristics changed, "blacks out."

"Scotchlite" Reflective Sheeting, as you may know, is a reflex-reflector. It directs collected light from an approaching auto headlight right back to its source. An entire sign of this material reflects the full message of that sign—the true shape, color and legend. Because of the optically flat surface of the sign its designed reflective characteristics are retained with a *minimum* loss of efficiency and performance in a heavy rainfall. Motorists can still see the entire sign clearly.

Where reflective elements are exposed, however, water fills in and alters the optical focus, causing a severe loss in reflection. The photo in Fig. 1 demonstrates this point.

Shown are two pieces of reflective material. That labelled "A" is optically flat "Scotchlite" Sheeting. "B" is exposed lens sign material. In the first picture, both are dry, both reflective. In the second, both have been placed *under water*. You can see how the sample of "Scotchlite" Sheeting continues to reflect to a high degree while the other, sample B, has blacked out. Here is positive proof that optically flat "Scotchlite" Sheeting succeeds in communicating when exposed lens systems fail.

All-weather performance

Because of its high brightness and optically flat construction, a sign of "Scotchlite" Reflective Sheeting gives the best possible performance in rain, snow, dew, etc. It is the best answer man has yet devised against the enemy—weather.

On the highway, motorists see the full shape, color and legend of a sign of "Scotchlite" Sheeting. Optically flat surface, with its reflective elements protected from the weather, remains distortion-free even during heavy rain. The sign cannot "black out."

Most effective sign material

Performance in any weather, of course, is just one measurement of an effective traffic sign. There are others that you may be interested in even more. For instance, ease of fabrication and maintenance, durability, economy. The most effective sign material for you is the material that offers the best performance and durability characteristics at the lowest overall dollar cost. Only precision-made "Scotchlite" Reflective Sheeting meets these requirements so well.

Your 3M Representative will be happy to demonstrate any or all of these points to you. See him soon.

Or for more data on effective, durable all-weather signs of "Scotchlite" Sheeting, write: 3M Company, Dept. GS-68, St. Paul 6, Minn.

WIDE ANGLE FLAT-TOP®

REG. U. S. PAT. OFF.

SCOTCHLITE

BRAND

REFLECTIVE SHEETING

PRODUCT OF 3M COMPANY RESEARCH

The terms "Scotchlite" and "Flat-Top" are registered trademarks of Minnesota Mining & Mfg. Co., St. Paul 6, Minn. General Export: 99 Park Ave., New York 16, N.Y. In Canada: P. O. Box 757, London, Ontario.

MINNESOTA MINING AND MANUFACTURING COMPANY—where RESEARCH is the key to tomorrow

Introducing... Eagle LANE CONTROL SYSTEMS

INCREASE TRAFFIC FLOW AS MUCH AS 50%

Here is the solution that has proven highly successful in areas where heavy volumes of traffic alternate from one direction to the other at different periods.

The system may be operated by simple time switch control to define usable lanes or by an electronic computor based on traffic sampling. Both types are now in operation in Atlanta, Georgia. A system is now being installed on Chicago's North Side.

Lane indications are available in a wide variety to suit installation. Write for complete descriptive bulletin.

- A COMPLETELY AUTOMATIC ELECTRONIC TRAFFIC DENSITY COMPUTER SYSTEM
- "BUILDING BLOCK" DESIGN FOR MAXIMUM FLEXIBILITY AND SERVICING
- COMPONENTS INCLUDE A "TRAFFIC FLOW" COMPUTER (shown above); A "LANE SELECTOR," A TRANSFER UNIT" AND 12" SQUARE LANE INDICATIONS WITH BLACK SYMBOLS AGAINST ILLUMINATED BACKGROUNDS

EAGLE

EAGLE SIGNAL CORPORATION
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Mail Coupon Today

EAGLE SIGNAL CORPORATION, Municipal Division
Dept. TE-658, MOLINE, ILLINOIS

Please send complete descriptive Bulletin H10 on Eagle LANE CONTROL SYSTEMS.

NAME & TITLE

MUNICIPALITY

FULL ADDRESS

OHIO TURNPIKE STUDY

(Continued from page 22)

train, he would be unable to stop the vehicle to avoid a collision. In a like manner, if a driver is traveling less than 26.4 MPH, he would be unable to accelerate and beat the train. The speeds between 14.4 MPH and 26.4 MPH are in effect a "trap," and under the conditions given above, a collision would result. As the distance between the two curves narrows, this range where collisions result lessens, and the intersection of the curves would then be the critical speed.

Where vision is good, there is no range of speeds that is a "trap" and accidents are entirely the result of carelessness. In order to provide marginal protection at vision-impaired crossings, flashing light signals are necessary. In the interim, until lights are installed, a sign advising a maximum safe speed of 15 MPH has been installed at this crossing, as shown in Figure 4.

Figure 4

Membership Applications

APPLICATIONS FOR TRANSFER

BACCHUS, Grant A.
Assistant Traffic Engineer, Metropolitan Toronto Plainning Board, 133 Richmond Street West, Toronto, Ontario, Canada. April 25, 1958 for ASSOCIATE grade.

BULLOCK, George W.
Traffic Engineer, City Hall, Burbank, California. April 28, 1958 for ASSOCIATE grade.

BURNS, Harry F.
Traffic Engineer & Associate, A. D. Margison & Associates Ltd. 30 Eglinton Avenue East, Toronto 12, Ontario, Canada. April 11, 1958 for MEMBER grade.

EDENS, Hendrik J.
Head, Traffic Engineering Section, De Leuw, Cather & Co. of Canada Ltd. 1491 Yongs Street, Toronto, Ontario, Canada. May 1, 1958 for ASSOCIATE grade.

LARSON, Robert A.
Assistant Planning Engineer, Wayne County Road Commission, 7th Floor, County Building, Detroit 26, Michigan. April 25, 1958 for ASSOCIATE grade.

NEW APPLICATIONS

BILEK, Robert F.
Traffic Service Supervisor, Chicago Park District, 425 East 14th Boulevard, Chicago 5, Illinois. April 9, 1958 for ASSOCIATE grade.

ECKHARDT, Jack E.
Assistant District Engineer, California Division of Highways, Box 2304, Terminal Annex, Los Angeles 54, California. April 21, 1958 for ASSOCIATE grade.

ELIAS, Wilbur J.
Associate Highway Electrical Engineer, California Division of Highways, 1976 East Charter Way, Stockton 5, California. April 15, 1958 for ASSOCIATE grade.

FLANAGAN, William E.
Principal Traffic Engineer, Boston Traffic Commission, 112 Southampton Street, Boston 18, Massachusetts. May 1, 1958 for ASSOCIATE grade.

FURNESS, Kenneth P.
Assistant Route Analysis Engineer, Ontario Department of Highways, Parliament Buildings, Toronto, Ontario, Canada. April 25, 1958 for ASSOCIATE grade.

(Continued on page 39)

Yearbook Changes

BUCKMAN, T. Robert (Member)
Traffic Engineer, Traffic Engineering Department, 263 West 10th Street, Fort Worth 2, Texas.

COPELL, Edgar F. (Member)
Consulting Engineer, De Leuw, Cather & Brill, 361 Boylston Street, Brookline 46, Massachusetts.

COYLE, Lewis R. (Associate)
Traffic Engineer, Tippetts-Abbett-McCarthy-Stratton 62 West 47th Street, New York 36, New York. PLaza 7-8000. SEND MAIL: 941 West 5th Street, Plainfield, New Jersey.

DANIELS, Jack A. (Junior)
Engineer I, Traffic Engineering Department, 263 West 10th Street, Fort Worth 2, Texas.

EVANS, Robert (Junior)
Assistant Traffic Engineer, Room 400 City & County Building, Salt Lake City 11, Utah.

FRATAR, Thomas J. (Member)
Partner, Tippetts-Abbett-McCarthy-Stratton, 62 West 47th Street, New York 36, New York.

GAFVERT, C. Hartley (Associate)
Traffic Engineer, Highway Planning, Pennsylvania Department of Highways, 21st & Herr Streets, Harrisburg, Pennsylvania. SEND MAIL: 324 Nyes Road, Harrisburg, Penn.

HAMMOND, Harold F. (Member)
Executive Vice President, Transportation Association of America, 1000 Connecticut Avenue, N. W., Washington 6, D. C. MEtropolitan 8-0685.

HARRISON, Billy J. (Junior)
Assistant Traffic Engineer, Traffic Engineering Department, 263 West 10th Street, Fort Worth 2, Texas.

LAPIN, Howard S. (Associate)
Lecturer & Research Associate, Institute for Urban Studies, University of Pennsylvania, Philadelphia 4, Pennsylvania.

MITCHELL, Robert A. (Member)
Chief Engineer & Traffic Engineer, Street & Sewer Department, 270 Public Building, Wilmington 1, Delaware.

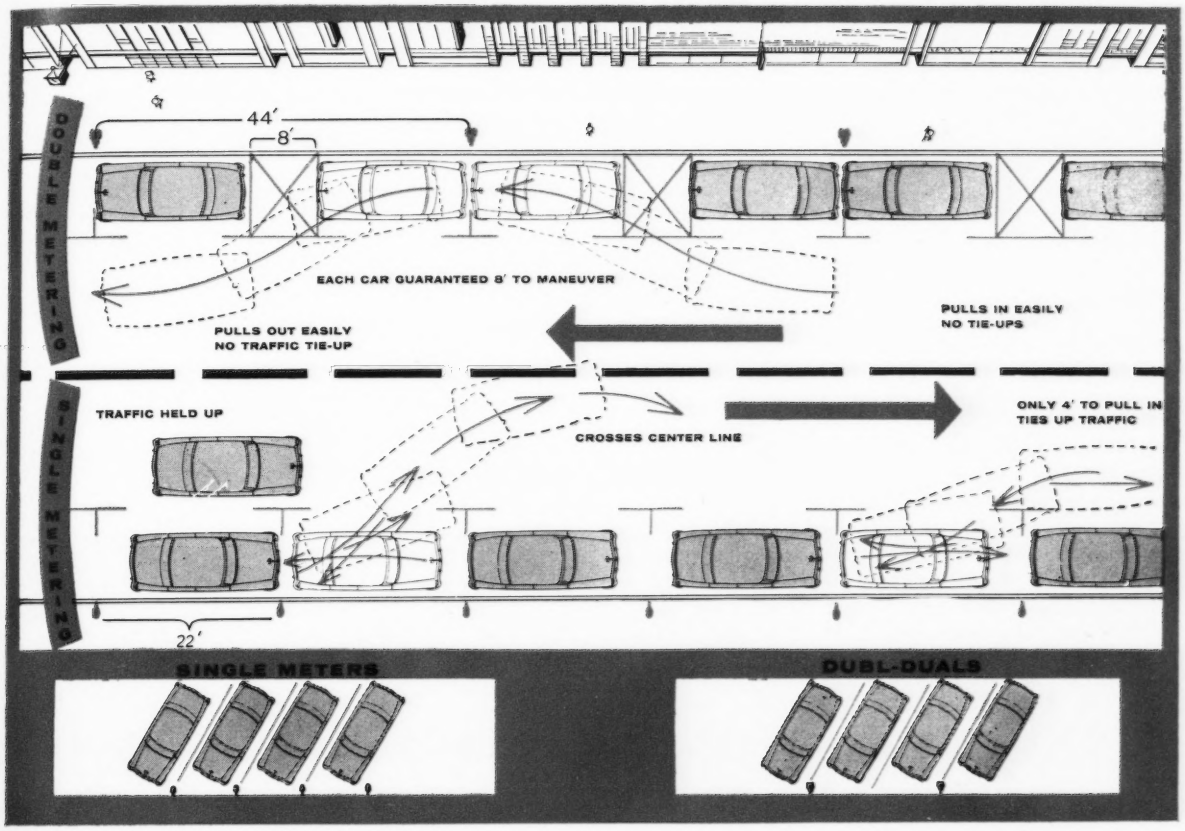
NIELSEN, M. Thor (Junior)
Director of Traffic Engineering Services, City Hall, Ottawa, Ontario, Canada. CEntral 2-7331.

SHREVE, Frank T. (Junior)
Assistant Traffic Engineer, Room 334 Kennebec Building, 141 West Ocean Beach Boulevard, Long Beach 2, California. HEmlock 6-9041, Ext. 350.

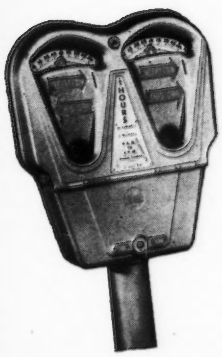
ZIMMERMAN, John W. (Associate)
Engineer-Manager, Calumet Skyway, 8801 South Anthony Avenue, Chicago, Illinois. REgent 1-8383.

NOW!
a NEW solid-color PVC
POLY-CONE*
tough, durable, no seams, will not CRACK, TEAR or BREAK!
This new SAFE-T-CONE never needs repainting. Just wash it with soap or solvents. Made of polyvinyl-chloride to produce the toughest, *most durable cone on the market.* Outlasts ordinary cone many times . . . . without upkeep!
*Polyvinyl-chloride
Brilliant SOLID YELLOW or SAFE-T-GLO COLORS
2191
SAFE-T-CONE®
TRAFFIC GUIDES
28" 18" 12"
All-Rubber SAFE-T-CONES available in 3 SIZES!
Painted or Reflectorized
ALL RUBBER
Regular all-rubber SAFE-T-CONES, now better than ever. Painted standard red and yellow or reflectorized.
Plastic or All-Rubber
FLUORESCENT
New Poly-Cones and All-Rubber cones available in brilliant orange-red fluorescent for extra brilliance, day or night.
SAFE-T-CONES made only by Radiator Specialty Co.
Charlotte, N. C.

HOW TO MAKE THE MOST OF EXISTING PARKING SPACE



Only Dubl-Duals get the most out of existing parking space and reduce metering costs 27% in the bargain



The drawing above shows clearly how Dubl-Dual Parking Meters insure eight full feet between cars while single meters often reduce space to only four feet. Note too how traffic flows more easily and safely when cars are assured adequate room to maneuver into and out of the parking spaces.

But greater utilization of parking space is only part of the Dubl-Dual story. Since Dubl-Duals are two separate meter mechanisms in a single case, initial cost is lower. And installation costs are reduced because only half as many meter stand installations are required. Dubl-Duals also reduce collection and inspection time . . . every other meter "stop" is eliminated.

There are lots of sound, proven reasons why your community should investigate the economy and efficiency of Dubl-Dual metering. Send the coupon for complete details in the new, booklet on Dubl-Dual Parking Meters. Dual Parking Meter Co., Subsidiary of Rockwell Manufacturing Co., Pittsburgh 8, Pa.

DUAL PARKING METERS
another fine product by
ROCKWELL

Send for this free booklet today

☐ Please send complete information on Dubl-Duals.
☐ Please have your representative call.

Name_____ Title_____

City_____

State_____

Letter to the Editor

Sir:

There is a problem which I feel is national in scope and would be a good subject for a study. That is the confusion and accidents which result from using the same color and design of lane line in a two-lane two-way highway that is used in a one-way two-lane portion of a divided highway. Since my records and surveys are necessarily confined to the city streets, I do not have the data to study the problem.

I do know that at the present time in all the Western States the highway construction problem has created a situation where a section of roadway will be divided and sometimes one-half of the divided roadway is at a different location or on a different elevation from the other half. Drivers who have been driving for a few miles on such a divided highway suddenly find themselves on a similar highway with exactly the same type of lane line and have overlooked whatever signs might have been erected to indicate the end of a divided highway. Many accidents, most of which are serious, occur when the driver on a horizontal or vertical curve will pass or drive in the left lane still thinking he is on one-half of a divided highway. In most of these cases where the driver survives he has stated that he thought he was still on one-half of a divided highway.

As long as we continue to have stretches of two-way two-lane highways mixed in between divided highways, this problem will continue to exist and will probably get worse as more divided highways are constructed. Also, drivers on a divided highway often times keep in a single lane because the other half of the roadway is not visible and they are afraid to pass slow moving vehicles on curves. Eventually of course we hope all of our major highways will be divided but in the meantime we will continue to have accidents of this type.

My suggestion would be to use a solid center line in all cases of two-lane two-way roadways which extend beyond the end of a divided highway. I realize some legislation would be required in some states to allow passing over a solid line.

Another problem which I have observed, which has arisen from the increased number of divided highways in California, is that when the two portions of the divided highway are separated by any distance other than a median divider or are at different elevations, traffic entering from side roads sometimes turns the wrong direction on the one-way portion of the highway. If traffic is light, this vehicle can travel a considerable distance and attain a high speed before meeting oncoming traffic. I feel that some research should be conducted in this field and I would like to have it as a topic of discussion at some future ITE meeting.

Traffic Engineer — LYNN STEWART
Fresno, California
April 25, 1958

low initial cost
low erection cost
lowest maintenance cost

Here's a new all-aluminum sign developed especially for the large signs required on major expressways. The "Increment Sheet Sign" consists of aluminum increment sheets hung vertically on a supporting frame. It can be made in any height or width, and for ground or overhead installation. Each sheet engages with the adjacent sheet, providing a smooth-faced sign panel.

The advantages are obvious; new lows in the cost of material, installation and maintenance. The aluminum never needs painting or other costly maintenance. Erection is quick and easy. Reflective materials or painted backgrounds are available in any type letters or symbols. As for strength, the sign above, on New Jersey's Garden State Parkway, is designed to withstand wind in excess of 100 m.p.h.

Send today for new pamphlet with full engineering data.

ONE RESPONSIBILITY TOO

Through our associate company, Pfaff & Kendall, Tassco can offer a complete range of standards and supports for ground signs and overhead spans to meet any requirement.

TASSCO

TRAFFIC & STREET SIGN COMPANY
84 Foundry Street, Newark 5, N. J.

Position Available

ST. LOUIS COUNTY, MO.

Position: Two (2) Assistant Traffic Engineers. To assist in the organization and development of a newly created traffic engineering program for St. Louis County, Missouri.

Requirements: Graduation from a four year college or university specializing in traffic engineering courses.

Salary: $5400 to $6588 annually.

Apply: Daniel J. Hanson, Traffic Commissioner, St. Louis County Division of Traffic, 115 N. Meramec Avenue, Room 202, Clayton 5, Missouri.

TRANSIT

(Continued from page 19)

taneous studies of speed and delay in the public streets by transit and traffic observers, thus providing data for a cooperative and constructive analysis of the causes of delay and the application of remedial measures, such as:

1. Enforcement of existing traffic and parking regulations;
2. Improved traffic control measures and devices;
3. Improved traffic signal timing and progression for transit and automobile operations;
4. Restriction of turning movements;
5. Restriction of curb parking in the prevailing direction of traffic flow during high-volume hours of the day;
6. Restriction of commercial vehicle loading;
7. Restriction, and eventual elimination, of double parking—using as drastic measures as necessary;
8. Pedestrian control, or elimination of such controls where not needed;
9. Provision of adequate transit stops and terminal facilities;
10. Provision of reserved transit lanes;
11. Provision of reserved transit streets;
12. Provision for the operation of transit on expressways.

Finally, there is the paramount matter of LEADERSHIP. Leadership is merely the means of applying the remaining "E" of the traffic engineer's code — EDUCATION. . . . Leadership is *education in action.*

I sincerely believe that our public officials owe it to their people to EDUCATE them regarding the chaos which increasing reliance on the automobile in congested areas can bring. It is their RESPONSIBILITY to see that the public knows and understands the possible consequences of their own actions, and the desirable features of alternative courses of action which may be far more in the over-all public interest in the long run. In short, it is their responsibility to exhibit the qualities of real leadership. We may still be talking the same way ten or fifteen years from now as we are today, but perhaps more sorrowfully as to "what might have been"—unless our public officials discharge their duty and responsibility for effective leadership.

MEMBERSHIP APPLICATIONS

(Continued from page 36)

HOLM, John W.
Associate Highway Electrical Engineer, California Division of Highways, 120 South Spring Street, Los Angeles 12, California. April 22, 1958 for ASSOCIATE grade.

JAGENBURG, Karl A.
Traffic Engineering Associate, Department of Traffic, Room 1000 City Hall, Los Angeles 12, California. April 21, 1958 for ASSOCIATE or MEMBER grade.

LEISCH, Jack E.
Chief Highway Engineer, De Leuw, Cather & Company, 150 North Wacker Drive, Chicago 6, Illinois. April 9, 1958 for MEMBER grade.

LOBENBERG, Jacques
Assistant District Traffic Engineer, California Division of Highways, 1976 East Charter Way, Stockton, California. April 15, 1958 for JUNIOR grade.

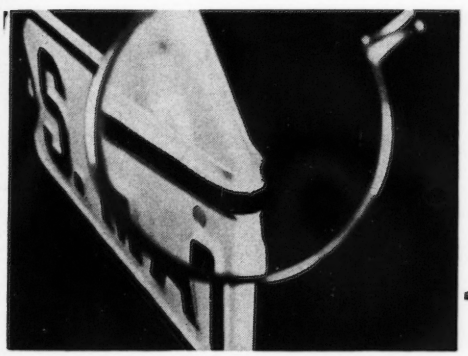
McKAY, Benjamin W., Jr.
Engineer-in-Training, 609 Municipal Building, 101 West Third Street, Dayton 2, Ohio. April 2, 1958 for JUNIOR grade.

MORRIS, Robert L.
Traffic Planning Engineer, Department of Transit & Traffic, 401 East Pratt Street, Baltimore 2, Maryland. April 16, 1958 for ASSOCIATE grade.

SUMMERSIDE, Robert V.
Director of Research & Traffic Engineer, South Dakota Department of Highways, Pierre, South Dakota. April 14, 1958 for ASSOCIATE grade.

TROSPER, Gilbert A.
Street Lighting Engineer, Pacific Gas & Electric Company, 245 Market Street, San Francisco, California. April 16,1958 for ASSOCIATE grade.

WELLONS, William B., Jr.
Traffic Engineer, City, 405 Biltmore Way, Coral Gables, Florida. May 2, 1958 for JUNIOR grade.



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Section News

INDIANA, MICHIGAN AND OHIO SECTIONS

A second annual joint meeting of the three sections (with a special invitation to all Ontario members to join the group to make it a District 3 meeting) has been planned for September 19, 20 and 21. The meeting will be held at Pokagon State Park, near Angola, Indiana. Wives are invited. *Ted Siegel* is chairman of the Arrangements Committee, and *Ed Gervais* is responsilbe for the program. Mrs. Harold Eckhardt, Mrs. Cy Clark and Mrs. Bob Holaday will look after the ladies entertainment.

METROPOLITAN (N.Y.) SECTION

February Meeting

Thirty-three members and guests attended the meeting held in the Essex House, Newark. President Leonard reported that the greater New York Council of the Boy Scouts of America has requested the assistance of the Metropolitan Section in their safety campaign. The executive committee of the Local Section will meet with the Greater New York Council and discuss ways in which the Metropolitan Section can be of assistance. President Leonard also reported that the Local Section would volunteer to host the Regional Seminar on Expressway Operations.

Mr. David Baldwin, Executive Secretary of the ITE came up from Washington to attend the Local Section meeting. It was indeed a pleasure to all members of the Local Section to have the Executive Secretary attend the Section meeting. Mr. Baldwin made a few remarks on the present status of the Institute and stressed in particular the importance of each individual and each local section of the Institute in the continued growth and importance of the profession.

Mr. Woodham, the principal speaker of the evening, gave a most interesting talk on developments in air safety. He illustrated the problems facing large metropolitan centers in the location of airports, the concentration of air traffic and the problems of maintaining safe air travel in the vicinity of large metropolitan areas.

March Meeting

The fickle weatherman unfortunately chose Thursday March 20 to drop one of the worst snowstorms in years on the New York-New Jersey area. As a result the attendance at our annual Ladies' Night at Mayer's Parkway restaurant suffered badly. Twenty-four hardly souls did challenge the elements, however, and were rewarded with a most enjoyable evening of dinner, dancing and a double share of cocktails. You, who were buried under a snowbank can have the satisfaction of knowing that your share was not wasted. It was a wholly delightful evening and next year we'll hope for better cooperation from the weatherman. The Section wishes to thank the Auto Club of New York, the Marbelite Co., the Veon Chemical Co., and the Walter Sign Co. for their consideration in providing the cocktails.

Successive Approximation of Future Highway Volumes

The Highway Transport Research Division of the U. S. Bureau of Public Roads recently reviewed various successive approximation procedures for forecasting future highway trip volumes, all based on the method developed by Thomas J. Fratar and used in the Tippetts-Abbett-McCarthy-Stratton report of February, 1955 entitled "Comprehensive Arterial Highway Plan, Cuyahoga County."

The successive approximation method for traffic distribution involves an input of original data for the first calculation, the output of the first approximation becomes the input of the next approximation and so on until the required degree of conformity is obtained. For readers who are familiar with the Hardy Cross moment distribution procedure used in structural analyses, the attractiveness factor used in the successive approximation method for traffic distribution is comparable to the stiffness factor used in moment distribution.

In the report of the Bureau of Public Roads prepared by Messrs. G. E. Brokke and W. L. Mertz of the Bureau staff, it is recommended that zones be established in accordance with present practice and that the zone to zone movement be forecast by the method developed by Mr. Fratar and used in the Cleveland report of Tippetts-Abbett-McCarthy-Stratton.

MIDWEST SECTION

Thirty-nine members and guests of the Midwest Section rendezvoused at the Old Prague Restaurant on the near North side of Cicero, Illinois, for the monthly gathering in April. Among the out-of-town guests present was George Howie, ITE Director from District Three. Vice President Al Forde officiated in the absence of President Zimmerman.

After a very delicious meal of roast duck, roast beef and "Kalochkies." Program Chairman Hartigan went through a sealed envelope routine with Charley Michalski and introduced the mystery speaker, Ralph Gross. Mr. Gross, a past president of this Section, is the Transit and Traffic Engineer for the Committee on Local Transportation of the City of Chicago. The subject of his remarks was "The Legislature's Role in Transportation." He emphasized the point that plans and ideas for transportation improvements cannot be realized unless they are acceptable to the elected representatives of the public. It is the engineer's job to convey his ideas to the local governments to gain their approval. The fact that most plans have financial requirements which are dependent on funds controlled by governmental bodies make this approval essential. A lively discussion period followed by conclusion of Mr. Gross' remarks.

NEW ENGLAND SECTION

The March meeting of the New England Section of the ITE was held at the Club 57, Boston, Massachusetts with 67 members and guests in attendance.

President Chandler raised the question of the desirability of sponsoring a Regional Seminar on Freeway Operations in the New England Area. After some discussion it was agreed that the New England Section invite the Seminar Steering Committee to present a program in the New England Area. It was voted that a session of this type would be joint with the New York Metropolitan Section of the ITE. On further discussion it was decided that we should make every effort to hold the meeting in July or August of 1958 if at all possible.

Following the business meeting President Chandler introduced guest speaker D. Grant Mickle of the Automotive Safety Foundation. Mr. Mickle spoke on the activities of the National Committee on Urban Transportation—in particular on "Better Transportation for Your City." Discussion followed.

WESTERN SECTION

The annual meeting of the Western Section is scheduled for Sacramento June 18, 19 and 20. Plan to attend. Technical Sessions will include those devoted to traffic forecasting and planning, better signing for the motorist, speed limits and enforcement and signal controlled developments. In addition, a choice of field trips will be available.

Arizona-New Mexico Area

During the week of April 7, the Planning Engineers of the Eleven Western States held a meeting in Phoenix. ITE'ers who came included *Squeege, Elmer,* and *John* from Washington, *Head, Dec,* and *Blensley* from Oregon, *Zell* from California, *Ross* from Idaho, *O'Connell* from Wyoming, *Ted Holmes,* B. P. R. from Washington, D. C., and *Thompson* from Arizona.

To celebrate the gathering of so much talent, the WITE's broke bread together at the Flame Restaurant. *Chuck Haley* and *Arnold Johnson* attended this session. *Elmer Clees* insisted that breaking bread was too common for him, so he broke a tooth.

Among the many papers read, *O'Connell* told of his problems involved with bypasses, *Head* related how Oregon's new organization plan worked (in spots). *Clees* explained his programming activity, and *Zell* expounded about how computers prove the need for paving all of California. Conference summaries were delivered by *Holmes* and *Glaze.*

John Caarls has spent most of the winter convalescing and still is working only part time. Bill Ealy is carrying on in his place.

Oregon Area

The Northwest Regional Highway Conference sponsored by the Joint Committee on Highways of The American Municipal Association and the American Association of State Highway Officials held in Portland March 24-25 met with considerable success. This conclave presented the first opportunity for Federal and State officials to join with City and County officialdom on such a scale to discuss and attempt to solve mutual problems relating to highway construction. More than 200 delegates from Washington, Idaho, Montana, and Oregon were in attendance. Speaking at the Monday luncheon, Mr. *Pyke Johnson,* Past President of the Automobile Safety Foundation and often called the father of the Highway Bill praised the benefits of freeways and called for more freeway construction to meet the expected increase in Traffic. On Tuesday Mr. *E. H. Holmes,* Assistant Commissioner, Bureau of Public Roads, gave the conferees his impression of the highway construction program from a national viewpoint. Highlighting the last day of the conference were the individual State Highway program workshop sessions.

During the latter part of the week, March 24-28, traffic engineers, Bureau representatives, and highway engineers from the four northwest states gathered in Portland for a Regional Highway Design Conference sponsored by the Bureau of Public Roads. Considerable time was devoted to discussing problems connected with the design of inter-changes on the Interstate System. Questions on this subject ranged all the way from geometric design standards to warrants for grade separation for livestock movements. The panel on Interstate Signing Standards also provided a lively discussion period.

Washington Area

The second annual Puget Sound Traffic Engineering and Enforcement Clinic, under the auspices of the Seattle-King County Safety Council, was held in Bellevue, and

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one of the highlights was *Bob Dunn's* now famous talk on speed limits.

Washington State College had its Annual Road Builders Clinic, and this year, for the first time, it was devoted entirely to traffic and Planning subjects. The Clinic was well attended and quite a number of WITE members were program participants. Those participating and their subjects were: *"Squeeg" Glaze,* Traffic Trends; *Yosh Kosai,* Signs and Markings; *Marv Lotspeich,* One Way Streets; *Elmer Leland,* Four-Way Stops; *Herb Higgins,* Why Have Toll Facilities?; *Bill Kingman,* Accident Studies, *John Mladinov,* Stastical Treatment of Traffic Data.

Mrs. Julia Butler Hansen, Chairman, Legislative Fact-Finding Committee on Highways, Streets and Bridges, State of Washington, was the guest speaker for the Clinic banquet.

It seems the Clinic was too hard to *"Squeeg" Glaze* as he spent about a week in the hospital in Spokane right after the meeting. We are glad to report that he is up and around after his siege of back trouble.

The Washington State Highway Department has awarded its first sign contracts for an Inter-State highway system. They are the Olympia Freeway, to be opened this Fall, and the Moses Lake Bypass.

At a recent meeting of the Washington area boys, a discussion of presenting a short course in Traffic Engineering was brought up and the groundwork is being laid now for such a course to be held next Fall at the University of Washington with ITE members as instructors.

At the same meeting, it was decided that a definite bid would be made at the Sacramento meeting for holding the WITE conference in 1959 in Seattle during the gala week of Seafair. So start planning now on bringing the family to the conference in 1959.

The co-chairmen for 1958-59 have been selected. They are *Tom McLeod* and *Dick Carlson,* with *Yosh Kosai* appointed as Area Scribe.

Sacramento Area

Between running the City Traffic Department, the Committee on Hotels for the WITE convention, completing a new 7-room home, and taking care of a son who broke his leg skiing, the *Dudley Stevenses* are kept fairly busy . . . *Roy Matthews* and *George Langsner* attended the highway Lighting Institute put on by the General Electric Company in Hendersonville, North Carolina. It is understood that Roy's observations were well-suppressed . . . *Zell* just this week returned from the WASHO Conference of Planning Surveys in Phoenix . . . *Bissell* joined the City of Sacramento . . . *Pearson* was initiated to Sacramento Valley winters by being flooded out his first season here . . . *Stevens, Pearson, Bissell, McKenzie* and potential member Henry O. Case journeyed to Richmond to attend a meeting of the San Francisco Bay Area (we wonder why we don't call these Areas, Chapters?), at which Case delivered a statement on freeway accidents . . . *Moskowitz* journeyed to Chicago in March to confuse the members of the Northwestern University short course in Traffic Engineering about trick signal phasing and to give them straight information about high-volume freeway traffic flow . . . *Faustman* has recently been awarded the following kudos: A) Doctor of Engineering by the University of California, b) Phi Beta Kappa, c) Trophy for the outstanding Camellia Reticulata at the Sacramento Camellia Show. This last is no mean feat since Sacramento is the camellia capital of the world . . . *Webb* is going to Ohio towards the end of April in order to see how the ITE is running their regional seminar at that location . . . Although *Schoppert* resides in Washington, D. C., he has attended more Sacramento meetings than most of the members of this area and upon payment of $1 he will be promoted from a second-class to a first class member of the area. . . The Sacramento Area belatedly welcomes *George Langsner* who moved here in January from Los Angeles to take over the State Design Engineer job . . . Congratulations to *Gilliss* who was appointed Director of Public Works for the State of California in January . . . We also wish to welcome *Rudy Israel,* Assistant Traffic Engineer of the Division of Highways in charge of Signs, and *Pete Koltnow,* Traffic Engineer of Fresno County . . .

San Diego Area

We wish to congratulate *Hal Durham* on his recent promotion to Associate Traffic Engineer with the City of San Diego.

The City has won a 4 year battle in the La Jolla area by removing the diagonal parking from a section of Girard Street, *Marty Bouman* suggests that traffic engineers using official cars avoid this section because the last time he drove Girard Street, rocks were thrown at him.

Jim Reading announces that the City of San Diego has installed on an experimental basis, a leading green phase for vehicles at 4 downtown signalized intersections. Preliminary studies show that the leading green effectively reduces the conflict between turning vehicles and pedestrians only when there is strict observance of the signals by the pedestrians.

Ed Hall, San Diego Transportation Research Director, presented a paper, "San Diego's Program of Urban Transportation Coordination," at the Northwest Regional Highway Conference, at Portland, Oregon, on March 25.

Thomas Dean, ITE'r from Nashville, Tennessee, is making a 3-day visit with San Diego's Transportation Research Staff prior to initiating a transportation study in Nashville under Mayor Ben West who is Chairman of the National Committe on Urban Transportation.

During the past three years, *Steve George* of the San Diego Metropolitan Area Transportation Study has established a large number of continuing, traffic fact-gathering studies. Having established the studies on a periodic, repetitive basis, or on a continuing current basis, as appropriate, Steve is now summarizing the results of the initial fact-gathering studies in a series of factual reports. *Jim Reading* and *Ed Hall* credit the success of the initial fact-gathering studies and the smooth transition of these activities to Traffic Engineering to Steve. The Transportation Study is now engaged in the application of the facts toward the solution of urban transportation problems.

San Joaquin Valley Area

Doug Carmody in Modesto reports two major advances for Traffic Engineering there. A new Traffic Ordinance, patterned after the Uniform Traffic Ordinance for California Cities and *clearly* defining the duties of the Traffic Engineer has been adopted by the City Council.

The Council has also adopted a new ordinance on Taxi Regulations, clarifying the procedure, and designating the Director of Parking and Traffic as the responsible official.

Those interested in obtaining copies of the ordinances, or other information, may do so by writing Doug in Modesto.

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Letter to the Editor

Sir:

I want to comment on Mr. Bartel's article in the April issue of *Traffic Engineering*—"No Passing Zone Procedures." He has worked out a very fine method of determining and locating these lines. In Wyoming, we used a similar set up with the one exception that we actually stopped the vehicles, marked the pavement, and proceeded until the next restriction appeared.

I noted the maximum design distance at 60 MPH was 1000 feet, using a line of sight of 4½ feet above the pavement. I have been quite concerned regarding this line of sight because of the change in design in our modern vehicles. The line of sight in the new cars is closer to 4 feet (and certainly much lower in the sports cars) above the pavement, and I believe we should give consideration to extending our barrier lines accordingly.

In Wyoming, we have extended the barrier 160 feet on the approach to each restriction in order to take care of this lowered line of sight. Several other states have similarly extended their barriers, and I wonder if other readers have comments on this.

ROBERT C. O'CONNELL

Traffic & Research Engineer
Wyoming Highway Dept.
May 2, 1958

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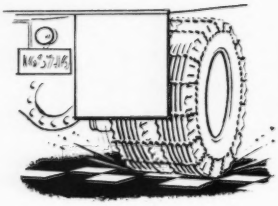

NO SCUFF! Prismo Plastix is resilient—lasting for years.

NO SKID! Plastix is safe for pedestrians. No glossy, skiddy surfaces to cause damp weather, pedestrian hazards.

NO SQUINT! Bright at night, Plastix Messages are outstanding!

PRISMO REFLECTIVE PLASTIX

PERFORMS BETTER L-O-N-G-E-R

In cities all across the country you will see year-in, year-out proof that Prismo Plastix is the most durable of all reflective materials for marking cross-walks and safety zones. Superior quality plastic, thoroughly impregnated with highly reflective glass spheres, are available in a variety of lengths and widths and in the new Plastix Discs. Application is fast and easy, and where the traffic is heaviest, Plastix shines best, giving safe, dependable visibility day and night.

PRISMO

Write for Prismo Plastix Catalog PX-56

PRISMO SAFETY CORPORATION / Huntingdon, Pa.